MARKETS FOR YUKON FOREST PRODUCTS

by
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Canada

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Government

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In order to obtain a more complete understanding of the opportunities and constraints to the development of Yukon's forest industry, the governments of Canada and Yukon signed a special agreement in October, 1986. The Yukon Departments of Renewable Resources and Economic Development: Mines and Small Business, Indian and Northern Affairs Canada and the Canadian Forestry Service agreed to finance an eighteen month series of studies on Yukon's forest industry. This work was also supported by the Yukon Forest Industry Association.

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Abstract

Development of the forest industry in Yukon is dependant upon the existence of markets that the industry can supply competitively. This study summarizes the available information on the timber resources of Yukon, reviews the historical and present markets for each of Yukon's forest products, and provides an overview of the local and export markets, along with a discussion of the impact that external factors such as exchange rates, and tariffs can have upon these market prospects. Finally, the report provides options for possibly implementing, in the near future, a marketing strategy.

The study demonstrated that the most significant market opportunities for Yukon's forest industry exist within the Territory itself and the first priority is to develop that market. Yukon must work to penetrate the entire 15 million fbm local market for sawn lumber and to undertake measures to obtain revenue from the entire tree. The Mackenzie Delta and Alaska markets are the most important regional markets, with opportunities to export up to 30 million fbm to these areas.

Offshore opportunities do exist for Yukon wood products. United Kingdom is the prime region for standard dimensional sawn lumber and joinery materials. China, Korea, and Japan provide opportunities for exports of specialty lumber products and logs. Pulp chip and logs are other forest products with offshore export opportunities. Several other prospects such as a panel board plant, pulp and paper mill, glue laminated beam plant, and new-wood processing systems do not appear to be viable at this time. A few products, such as preserved wood, appear viable and a complete feasibility study should be completed.

The study notes that any forest marketing strategy in the Yukon must recognize the complementary nature of production between the large Hyland Forest Products Mill and the remaining small mills. Hyland should concentrate on the production of standard sawn lumber products while the smaller firms should become adept at producing specialty products such as panelling, special product dimensions, and siding. Joint ventures between Hyland and smaller firms should be considered and supported on all foreign sales.

The study indicates that efforts need to be made to strengthen the forest industry association, to increase forest products marketing and to conduct further research and development in order to assist the industry to become and remain competitive.

Résumé

L'industrie forestière du Yukon ne peut se développer que s'il existe des marchés qu'elle est capable d'approvisionner de manière concurrentielle. Cette étude résume les données que l'on possède sur les ressources forestières du Yukon, passe en revue les marchés traditionnels et récents pour chacun des produits forestiers de ce territoire et donnee une vue d'ensemble des marchés locaux et des marchés d'exportation. On y trouve aussi un exposé sur les incidences que des facteurs externes tels que les taux de change et les tarifs douaniers ne peuvent manquer d'avoir sur l'évolution de ces marchés. Enfin, cette étude propose différentes options susceptibles de conduire, dans un porche avenir, à la mise en place d'une véritable stratégie de commercialisation.

Selon cette étude, le marché le plus prometteur se trouve être le territoire lui-même et c'est lui qu'il faut développer en premier. Le Yukon doit s'efforcer de conquérir tout le marché local du bois de sciage évalué a 15 millions de pmp at s'ingénier à tirer parti de toutes les ressources que l'arbre recèle. Il est possible de livrer jusqu'à 30 millions de pmp sur les marchés du delta du Mackenzie et de l'Alaska, qui sont les plus importants de la région.

Le Yukon a également la possibilité d'écouler ses produits forestiers outre-mer. La Grande-Bretagne est un marché de choix pour le bois de sciage de dimension standard et le bois de menuiserie. La Chine, la Corée et le Japon sont ouverts à l'exportation des produits forestiers spéciaux et du bois en grume. Les copeaux à pâte et les rondins sont d'autres produits forestiers facilement exportables outre-mer. Plusiers autres projets ne semblent pas viables à l'heure actuelle, p. ex. l'installation d'une usine de fabrication de panneaux de lambrissage, d'une usine de pâte et papier, d'une usine de poutres lamellées collées, ainsi que la mise en application de nouvelles méthodes de traitement du bois. La fabrication de certains produits tels que le bois traité est déjà possible, mais une étude complète de faisabilité est nécessaire.

Le rapport insiste sur le fait que toute stratégie de commercialisation des produits forestiers du Yukon doit absolument tenir compte de la nature complémentaire de la production de la grosse firme Hyland Forest Products Mill et des entreprises plus petites. Hyland devrait se concentrer sur la production du bois de sciage de dimension standard tandis que les entreprises plus petites devraient se spécialiser dans certains produits tels que les panneaux de lambrissage, les produits de dimension spéciale et le bois de parement extérieur. Il serait bon d'encourager et d'aider tout projet d'entreprise mixte entre Hyland et les sociétés plus petites, pour tous les produite exportés.

La rapport souligne que des efforts doivent être faits pour donner plus de cohésion a l'industrie forestière, pour améliorer la commercialisation et pour activer la recherche et le développement, si l'on veut que cette industrie devienne et demeure compétitive.

Executive Summary

Development of the forest industry in Yukon is dependant upon the existence of markets that the industry can supply competitively. Identification of such markets and products is a very high priority for both industry and government. This study provides preliminary information to business and government on the market prospects for Yukon's forest products.

The report summarizes the available information on the timber resources of Yukon, reviews the historical and present markets for each of Yukon's forest products, and provides an overview of the local and export markets for various products. As well, the report looks at the impact that external factors, such as exchange rates and tariffs, can have upon these market prospects. Finally, the report provides suggestions on a possible marketing strategy that might be followed by government and industry in the near future.

Yukon Forest Resources

Yukon covers an area of 48.2 million (MM) hectares, with less than 7.3 MM hectares of productive forest land. It is estimated that this land can produce a total volume of 456 MM m^3 of logs. The annual allowable cut (AAC) on the other hand restricts that production to about 50-60 MM fbm per year. Forest resources competitively available to Yukon operators from B.C. can increase this amount to around 75 MM fbm per year.

Spruce and lodgepole pine are the predominate commercial species, representing over 95% of the total production. Lodgepole pine make lower quality dimensional lumber due to the numerous knots, but produces a superior range of finishing materials. Spruce exhibits the reverse tendency. Hence, effort should be made to separate the products and attempt to produce and market those products that each species can deliver most effectively.

Yukon's forests provide smaller diameter logs that require more effort per unit to harvest, create more wood residue, provide lower lumber recovery and provide a narrower range of products than is the case with adjacent coastal forests. However, Yukon forests appear to produce a higher quality and more consistent product for use in building construction and pulp and paper production. Moreover, several studies indicate that higher value board and specialty products can also be produced if care is taken in the milling process to maximize product quality rather than quantity.

Yukon firms must ensure that their production processes are geared to small log production rather than large log production and that every effort is made to maximize the quality of the products from each log. There is a pressing need for Yukon firms to find alternative methods to utilize their wood residues as a means of offsetting the greater effort required to log and saw their smaller logs.

Finally, Yukon firms need to have a clear understanding of the quality of their products relative to other regions if they wish to stack their potential 75 MM fbm of sawn lumber against the 21 billion fbm of sawn lumber produced each year in British Columbia.

Local Markets

In 1986/87, Yukon had 14 logging contractors, 17 active sawmills, 6 roundwood producers, 7 pine cone contractors, and 13 wood manufacturers in the territory. The majority of the owners of these firms were long term Yukoners who obtained only a portion of their income from the industry but provided seasonal jobs for a broad range of Yukoners located throughout the territory.

The local Yukon market is the primary sales area for Yukon forest companies. The demand for fuelwood products for domestic space heating was estimated to be about 57 000 cords in 1986, while the fuelwood producers easily supplied this demand at competitive prices. The potential for further increases in the domestic heating market is expected to parallel growth in the population, except in Faro where current demand for wood fuel has not been satisfied.

However, there is significant opportunity to supply fuelwood products to the industrial heating market. The market for industrial users is approximately 112 000 cords and is almost exclusively accommodated by fuel oil today. Wood chips and other wood residue could be used in central wood fuelled hot water heating facilities to supply heat to industrial users. A modest market penetration of 15% would increase demand for wood residue by more than 16 000 cords.

If full conversion to wood heat could be achieved there would be a $25.6 million reduction in imported fuel oil costs along with increased income of over $9 million to Yukon firms. Government must aggressively support projects like the Klondike Central Heating if it is to take advantage of the opportunities in this area.

Yukon operators presently supply approximately one third of the estimated 14.9 MM fbm market for sawn lumber products in the territory. Yukon firms are able to supply all the rough lumber requirements, but virtually 100% of the surface-dry lumber demand is met with imported products from B.C.

Hyland Forest Products could not supply surface-dry lumber in the Whitehorse market at a competitive price in June 1987, but it expects to be competitive with southern firms once the plant has been refurbished and is in full production. Smaller firms are not likely to be price competitive in the manufacture of standard surface-dry lumber and still remain profitable. These firms are encouraged to maintain their production in rough lumber

products and to expand production into specialty products where the higher value will overcome added production costs.

The opportunities for roundlog and pine cone sales in the domestic market appear to be limited at the present time. The local natural log home market has been extremely stable and small for the past eighty five years and is not expected to expand in the future. Cone demand is limited locally as there is no government reforestation at present. Moreover, even with a government reforestation program, demand would average only 50 hectolitres per year and picking for spruce, the major species, would occur approximately once in four years, when the cones appear.

Joinery materials, trusses and glue laminated beams, have a limited local market and the demand for these products is being accommodated by a handful of existing firms.

Export Markets

Yukon is in a good geographical position to supply materials to the North, the Pacific Rim, and to a lesser extent, Europe. The immediate market areas of the Mackenzie Delta and Alaska were reviewed and found to be major market targets. The Mackenzie Delta purchased 4-6 MM fbm in lumber annually during the first half of the 1980s in response to Beaufort Sea oil exploration. When exploration was curtailed in 1986 and 1987, consumption fell to less than 0.75 MM fbm annually and Yukon's market share fell as low as 0.2 MM fbm.

Immediate export prospects are poor in the Mackenzie Delta as the economy is still very depressed. However, new exploration activity is expected in 1988 and annual consumption could rise to as high as 10 MM fbm by 1990. Yukon has a competitive advantage in the supply of lumber to this region and has supplied the majority of lumber products to this region during this decade. Marketing efforts should begin now to access this market through visits to the oil companies and local suppliers in the region. Existing government trade programs should be used, including trade missions if possible.

Alaska is an adjacent region with significant demand for lumber products. Of the five major market regions in Alaska, the Interior region and the Prudhoe Bay area are the two that provide the greatest potential for Yukon. In the early 80's more than 11 MM fbm was exported to this region from northern B.C. and Yukon. While the amount has fallen to negligible amounts in recent years, there is significant potential for exports to the Interior of Alaska.

The Division of Forestry in Alaska conservatively predicts that demand in Interior Alaska will rise to 27.9 MM fbm by the end of the century and could in fact rise as high as 45 MM fbm. The northern market in Prudhoe Bay could add an additional 5-7 MM fbm once the industry recovers. With U.S. Forest Service limiting annual timber harvests to 7-10 MM fbm for forest lands in the Interior region, a potential demand of up to 26 MM fbm is available to Yukon exporters. Data shows that Yukon can supply air- or kiln-dried lumber to the Alaska market at competitive prices but will not be able to competitively supply green or rough lumber products.

Fuelwood exports also appear to be viable to the Alaska Panhandle and Seattle. Fuelwood can be supplied to Juneau for $111 Cdn/cord and to Seattle for $141 Cdn/cord while the prices for the product in those communities were $146 Cdn/cord and $166 Cdn/cord respectively. Further cost savings may be possible using backhaul loads to Haines Alaska for shipment by ferry to these communities.

Yukon firms must begin immediately to attempt to gain access to the Alaska markets. During visits this summer, distributors indicated a strong willingness to purchase Yukon products if they could match interior B.C. quality. Yukon firms must begin now to establish contacts through marketing visits and by inviting operators to visit Yukon mills to inspect product quality and availability.

The Pacific Rim markets are amongst the largest in the world, with Japan, Korea, Taiwan and China being the largest market areas. Korea and China are considered the best markets for Yukon as they are expanding economies with a relatively recent history of world trade in forest products. Korea and China are usually interested in purchasing SPF products in the form of construction grade logs, but will consider some forms of joint lumber/logs combinations. Demand in Korea is low for standard dimensional lumber products but is expanding rapidly for mine timbers, and specialty products such as interior panelling, joinery materials, and furniture and musical instrument stock. China's demand for non standard lumber products is expected to increase rapidly due to large government sponsored house construction programs and pent up consumer demand.

Taiwan and Japan are large markets but their consumers are sophisticated and demanding in their quality controls. Forest products consumption, particularly for construction materials is stable or declining and future prospects are for the market to continue to shrink. Marketing is complicated and demanding in this market place and is geared to large volume sales. Present suppliers appear able to effectively compete with Yukon firms for business, and exports to these countries do not appear to be promising. The only products that look favorable are very high quality beams and specialty interior finishes for traditional Japanese homes that can bring as much as $20 000/M fbm.

The United Kingdom provides a major opportunity for Yukon firms. This region has a rapidly growing economy that utilizes standard dimensional lumber prod-

ucts that are unavailable domestically. Hyland Forest Products has already obtained one sale into this market and further sales are expected. The U.K. economy is expected to grow rapidly and with careful marketing, this region can become a major export market for the territory.

The complexity of the market place in other European countries and the problems of tariffs, language differences, construction regulations, competition, and slow economic growth make these regions unattractive to Yukon. Australia and New Zealand have a similar situation which does not favor the Yukon.

However, India does show some potential for market penetration by Yukon firms. The economy is growing rapidly and domestic production is not keeping up with demand. Previously prohibitive tariff barriers on forest products are being reduced or eliminated and market supply is not controlled by any single country. These factors provide an opportunity for smaller Yukon firms to market specific products to this market.

Yukon appears to be competitive in supplying logs to the offshore market but is only a marginal supplier in the international markets for standard dimensional products. Yukon can profitably supply logs to the international market but cannot presently supply sawn lumber products to Japan or Korea on a break–even basis and are only marginally profitable on the U.K. market. Efforts must be made to attempt to reduce production costs wherever possible or Yukon firms will not be able to sustain long-term sales of standard lumber products to these offshore customers.

Yukon firms must develop personal contacts directly with offshore customers and emphasize supplying specific products to meet client demands in order to access this market. This form of value oriented market strategy is well suited to the smaller production levels of Yukon firms and is the only way to compete against the low value–low cost–high volume production strategies of competing regions.

To date, Hyland Forest Products has found it considerably cheaper to utilize backhaul loads to move their products directly to Vancouver for transshipment to the United Kingdom. Estimates in this research indicated that it costs $30-40 Cdn/M fbm extra to ship through Skagway, rather than Vancouver. Exports through Skagway are more expensive due to higher loading charges and expensive docking fees caused by the small volumes of sawn lumber to be loaded.

One suggested means of reducing this cost disadvantage is to explore the possibilities of joint shipping of lumber and ore on the Curragh Resources ships. Curragh's shippers can add capacity to load or use existing excess capacity when it occurs in order to haul Yukon lumber. This factor reduces substantially the dockage fees and allows Yukon firms to sign favorable deals for shipping 1–2 MM fbm loads offshore.

New Export Development Opportunities

Several forest products that Yukon mills could develop including panel board, pulp and paper, pine cones, pulp chips, and finishing materials were evaluated.

A panelboard facility is not considered viable at the present time. The potential markets are considered too small to accommodate the minimum plant production of 100 MM ft^2. Domestic markets would accommodate only a fraction of the production, regional markets would take a maximum of half the production, and offshore markets are costly to access due to high tariff barriers and higher transportation costs.

Recent research indicates that northern panel board producers will not be able to produce panel board for less than $185/M ft^2, a cost that is significantly higher than a competitive price of $160/M ft^2. Southern firms will continue to access the northern market at prices that are equal to or less than that which a local facility would offer. As well, one of the worlds largest and most cost efficient panel board plants opened in 1987 in Dawson Creek, B.C. and is likely to more effectively supply the markets than a Yukon facility. Finally, a panel board plant requires access to large timber blocks to provide an assured supply of wood and that access cannot be provided at present.

A pulp and paper plant in Yukon would provide significant economic benefits to the territory, but is not considered viable until the 21st century. Yukon has a high quality wood chip feedstock for a pulp and paper mill and with a long-term trend to declining pulpwood stocks in B.C., the potential for a future facility does exist in Yukon.

However, when the production costs of various plant types in the interior of B.C. are compared with those in Yukon, the analysis shows that it would cost 40% more to produce pulp products in northern B.C. A Yukon pulp mill would experience production costs of $526 Cdn/ADMT (1984$) while a northern B.C. firm producing a similar product would have costs of $373 Cdn/ADMT (1984$).

The most serious constraint to a new mill is the lack of cheap energy. A Yukon pulp and paper mill would require large amounts of power and is not likely to be able to produce power for less than $0.04/kwh, double the industrial rate charged in B.C. and Alberta. Moreover, it would take at least a decade to build the power capacity required to support a mill, since Yukon has an insufficient capacity at present to accommodate the demands of such a mill.

The pulp and paper industry is an extremely competitive world market where $15 Cdn/ADMT separates the most efficient from the least efficient operators. Under the present cost structure, a Yukon mill could not be competitive.

While a full pulp mill is not likely to be feasible for some time, the prospects for exports of pulp chips appears excellent. A Vancouver firm, Makin Pulp and Paper, is proposing to ship pulp chips from Yukon to Vancouver for input into a new pulp operation. The company expects to pay $150-$200/bdu to produce the chips and deliver them to their plant. This is significantly higher than the Vancouver market rate of $82/bdu but the firm will pay this amount in order to obtain a secure supply. Offshore markets in Japan, Korea, and Sweden are possible, however, some means is required to overcome the high ocean transportation costs.

Pine cone exports average 2400 hectolitres/yr and are expected to continue as a small but vital part of Yukon forest products exports. The present Swedish market is predicted to decline over time as their domestic sources come on stream, but alternative customers are expected to be found in other northern European countries such as Norway and Denmark. A small amount of additional seed will be required to supply a Yukon reforestation program.

Log cabin exports have traditionally been considered a very good export product. Alaska appears to provide an export potential as the limited wood supply and steady demand gives Yukon firms an opportunity to penetrate the market place. However, early indications point to several strong impediments to accessing southern and offshore export markets. These constraints include: lack of log home construction standards, bickering amongst suppliers, unreliability, poor quality control, and suppliers who are too small to meet minimum order sizes. Yukon firms face additional problems of costs for energy, labour, and transportation which reduce competitiveness.

Finishing materials such as stock for window casings, furniture, door frames, and stair casings are in high demand in Europe, especially the United Kingdom. An immediate demand for 3–4 MM fbm is available in the U.K. and further amounts are available in other European markets. Yukon firms should consider developing these specialty markets. A small Yukon firm or group of firms develop a remanufacturing facility that would produce joinery stock using standard lengths of lodgepole pine where possible along with laminated materials using finger jointers and EDGAR equipment. Yukon firms could then market a broad variety of high value pine lumber products locally and throughout the world.

Wood residues as input into various cogeneration facilities has potential. In addition to the wood fired hot water heating system being established by Klondike Central Heating, the possibility exists to develop thermal generating facilities. Hyland Forest Products has developed one facility and is studying the feasibility of providing power from the plant to the community of Watson Lake.

Other energy products such as wood pellets and densified fuel logs were found to be highly capital intensive businesses that have the potential to be cost competitive in Yukon under certain circumstances. However, these products were not expected to be able to secure sufficient market share to justify a business in competition with the existing low capital low cost solid fuelwood firms.

An Alaska study found potential for briquette style charcoal exports to the U.S. Pacific Northwest and Japan, while the Korean market appears to have potential for bagged or lump charcoal. Further feasibility studies are encouraged to determine if such exports are viable.

The market demand for treated wood products is presently too low to warrant a wood preservation plant. However, the interior Alaska market has a sizeable demand for treated wood and if the White Pass Railway reopens, and significant demand is created for fence posts as a result of the Yukon Pounds Act, a viable market would be created. Further feasibility studies should be undertaken to examine the feasibility of a wood treatment facility once the domestic market reaches 1500 m^3 annually, or double the present size.

A glue-laminated beam plant and new systems such as the parrallam system are not expected to be feasible in the Yukon and government should attempt to concentrate on the other more feasible alternatives. However, further research should be undertaken in cooperation with Forintek Canada Corp. in order to investigate new methods of using forest products for energy generation.

Finally, a Fairbanks firm called Northland Lumber Co. has significantly increased its profitability by selling wood residue such as sawdust and bark in the form of animal bedding, landscaping materials, and industrial cleanup. Yukon firms should actively pursue similar methods to utilize wood residue. Government commitments to undertake demonstration projects using this material could prove useful.

Marketing Strategy

The structure of the Yukon forest industry dictates that a multi–pronged marketing system be developed. Hyland Forest Products should be able to produce 20 MM fbm of good quality kiln-dried dimensional lumber products and meet all local sawn lumber demands and some portion of export requirements.

The remaining forestry firms in Yukon are very small businesses capable of producing green or air-dried lumber products. These firms are not competitive in producing kiln-dried dimensional lumber but are competitive in the markets for timbers, cabin logs, posts and poles, and in certain cases, in higher valued products such as siding, boards, flooring, and joinery materials. These firms must be encouraged to develop and expand their markets in order to make better use of these higher value-added materials.

The marketing strategy must recognize the complementary nature of the production from large and small mills and capitalize on that advantage by marketing the strengths of each segment. Joint venturing with Hyland Forest Products should be considered and supported on all foreign sales.

If Yukon's forest industry is to develop it must create a strategy that is predicated on three major objectives, namely:

- maximize the use of Yukon wood products in the domestic Yukon economy;
- develop and maintain unique niches in the export markets; and
- conduct ongoing research and development to ensure that the industry can remain competitive under changing circumstances.

1. Maximize the use of Yukon wood products

The first step is to attempt to substitute imported wood products with Yukon sawn lumber. This implies producing a good quality product, educating the consumer and expanding product variety. Initial efforts must be made to use existing government programs to assist firms to improve the quality and productivity of their equipment. In addition to financial assistance, firms will require technical and operating advice from forest experts. Moreover, both levels of government should ensure that there is a strong industry association available to undertake major activities including education, marketing and development.

An education program on Yukon wood products directed at Yukon consumers is essential to ensure successful product penetration. This education program must include the following three components: an accredited lumber inspection system that assures the consumer that he or she is purchasing lumber that meets national standards, demonstration projects that provide proof of the capability of Yukon wood, and an advertising campaign to educate Yukoners about the advantages of using Yukon wood. Several alternative methods exist to assist in implementing these components and effort should be made to use a cooperative government/industry mechanism.

Yukon should create a unique image of quality and reliability. A special Yukon forest logo, or the Yukon-made logo, should be used by forest operators on all exports.

A Yukon-wide advertising campaign should be developed to sell Yukon consumers on the advantages of using Yukon wood products in their home construction. The advertising would push product quality along with the economic benefits to the territory of purchasing the product.

Technical and advisory services should be provided to assist firms to modernize and diversify their products. Simple technical advice could provide low cost means of improving the quality of the sawn lumber produced, assist in establishing new small capacity kilns, and institute training programs to instruct operators on proper air drying techniques for those firms not able to take advantage of a dry kiln.

Firms should be actively encouraged to access existing government programs such as the Opportunity Identification Program, the Small Business Loan Program, the Renewable Resources Subsidiary Agreement, and the Yukon Energy Alternative Programs. The existing programs provide financial assistance to allow firms to modernize equipment, identify new opportunities and markets, purchase small dry kilns, expand inventory, and undertake marketing initiatives.

Peschke (1986) proposed the establishment of an Office of Forest Development similar to that in Alaska and Alberta to provide the technical assistance and marketing expertise to develop the industry. Alternative plans also exist to assist development and these should be explored.

Government can play a role in encouraging greater use of local products. The Yukon Department of Government Services has already initiated actions to give preference to the purchase of locally produced wood manufactured office furniture and the purchase of wood-fired hot water heating systems.

Further government initiatives should be taken to review the present purchasing policies to ensure that there are no impediments to using locally manufactured forest products. Government policies should ensure that both air-dried and kiln-dried materials that meet national grade standards can be purchased on local construction projects. Government should review policies to ensure that purchasing agents attempt to buy equivalent spruce products rather than fir, where possible, and that local wood be given preference in the construction of buildings that do not have to meet national building standards, such as campground shelters and outdoor toilets. Furthermore, Yukon wood siding could be utilized instead of non wood imported alternatives.

The CMHC could help to dispel the misunderstanding around the perception that only kiln-dried lumber is permissible in homes they insure, by providing more detailed information on the existing rules. By informing consumers that properly air-dried lumber can be used, a market will be available for Yukon to penetrate.

Finally, government could initiate specific initiatives to assist the forest industry. Funds could be provided to build a demonstration home that utilizes Yukon wood and educates consumers about the advantages of using Yukon wood products. The possibility of a community kiln, as recommended by Peschke (1986), could be evaluated and alternatives such as allowing access to the Wat-

son Lake kiln explored.

Government could consider rebating the Federal sales tax to consumers who purchase Yukon lumber products. The Federal government imposes a sales tax of 8% on all sawn lumber produced in the Yukon. If the government rebated the tax, it would effectively reduce the cost of the product by as much as $20/M fbm and would act as an advertising tool to promote the product. At present the cost to the government would be less than $10 000 annually, however, it could rise to $200 000 if the full Yukon market was converted to local lumber. The tax costs would be countered, however, by new sales valued at more than $3.2 million and income, employment, and other economic benefits from the use of local products.

Government must continue to aggressively study the prospects for more use of wood residue in industrial heating applications, and evaluate the prospects for wood-fueled thermal generating facilities in conjunction with their long range electrical energy strategy.

Substitution of Yukon products will also depend upon efforts by government and industry to develop more uses for domestically produced forest products. This requires a cooperative approach by government and industry to encourage the development of new designs that can utilize materials produced by Yukon firms. Government could also agree to use Yukon wood siding on its buildings. The Yukon government could finance the development of energy efficient home designs using post and beam construction. Post and beam construction would allow smaller firms to supply rough or planed beams for input into house construction. The use of locally prefabricated building components such as Nelson-type homes, or the NASCOR home framing system, may be another method to increase the use of local wood.

As well, the construction of government campsite buildings or sheds might be done using rough lumber rather than planed lumber, while increased use of Yukon wood panelling rather than imported gyproc in office walls would increase the markets for specialty products. Shelving from laminated pine rather than plywood or special Yukon siding on government buildings would be other examples of extending the use of Yukon products rather than importing southern products.

Assistance in testing new forms of woodstoves for certification that can accommodate wood residues or wood pellets as well as coal would provide further markets for Yukon wood products. As well, assistance for the roundwood industry to conduct the necessary heat and infiltration tests to meet CMHC standards, would help the log home building sector to expand operations.

The Yukon Government through the Yukon Energy Alternatives Program is investigating the feasibility of installing several more hot water heating systems in rural Yukon communities. These types of efforts must be supported and expanded in order to provide steady markets for wood residues. Moreover, the government should continue its policy of supporting the development of wood-based central heating systems, such as Klondike Central Heating, through efforts to provide guaranteed purchase contracts, loans, and other financial assistance to the industry.

The Yukon Development Corporation is considering the feasibility of using wood residues in the thermal generating plant in Watson Lake. Yukon Development Corporation should consider the use of thermal energy as part of their long term development strategy.

2. Develop a marketing strategy for export sales

In order to reduce the impacts of cyclical fluctuations in the Yukon economy and to accommodate expanded production, Yukon firms must look to export sales. The immediate northern regions of Alaska and the Mackenzie Delta provide the most promising markets but other regions should also be explored.

In order to ensure the greatest possible success in the export market place, there is a need to develop a comprehensive export marketing strategy and plan. The plan should key on ensuring high standards of product quality, distinctive Yukon products, cooperative marketing between small and large firms and a direct sales approach to foreign consumers.

Unique Yukon products, that are perceived as superior, are essential for competing in the world market place. It is essential to produce a high quality product and to use items such as machine stress rating or product quality tests to assist in convincing customers to establish brand loyalty. This loyalty is key to buffering Yukon firms from recessions and increased competition from developing nations.

A cooperative marketing approach to Yukon product sales in export markets appears desirable. Such a marketing approach would ensure product quality, develop uniform packaging, create a single advertising program, develop consumer education programs, coordinate the sales of various firms, and hold inventories. Several alternative methods are available to assist in the cooperative marketing approach including expanded use of the present brokerage firm, hiring a full time marketing person for all Yukon firms, creating a cooperative marketing arrangement within the Yukon Forest Industry Association, and direct government subsidies to individual firms to assist them to market their products.

Possible inclusion of interior Alaska operators in such a cooperative export agency should also be investigated as it would provide a broader base for exports and add to the product volumes, thereby reducing transportation costs. Both regions could benefit from the joint exporting of similar products, in much the same way as the

joint Alaska/Yukon tourism marketing is undertaken.

As indicated earlier, the most successful Alaskan log and lumber exporters have been those who have developed a personal working relationship with their consumers. Regular contact between Yukon firms and their customers is a key part of this type of personalized marketing process. This would include visits by prospective customers to Yukon mills, trade missions by Yukon operators to prospective customers, provision of samples of the product for comparison, and introductory sales of specific products in order to ensure product match to customer demands.

3. Conduct ongoing research and development

Ongoing research and development in the forest industry is the third key component of any market strategy. Research information is required on the quality and quantity of the forest species available in the Yukon, the types and quality of products that can be produced and the feasibility of producing a variety of products mentioned in the report.

Finally, market research and information on the Yukon industry and its competitors are major elements in determining the most prominent markets to access. One sign of a good business is its understanding of its markets and its clients.

Insufficient data are available on Yukon's timber resources, its quality, quantity, and characteristics. Therefore, a major research requirement is to conclude the forest inventory of the Yukon and conduct a variety of tests on wood quality.

Government and industry should conduct research into the quality of Yukon's present forests and methods to improve the quality of future forest stands. To prove the common belief of the superiority of Yukon wood species, product quality tests of selected Yukon timber must be undertaken. If the tests show that Yukon's forest products are of superior strength or quality, these results can be used as a tool to market the product. The feasibility of using machine stress rating amongst Yukon firms to ensure quality should also be investigated.

As well, product out-turn studies, that assess the quantities of various types of dimensional products that can be produced from logs of varying sizes, could be conducted to determine the most appropriate mix of forest products to be produced from Yukon forests. These studies are extremely useful in matching production to market demand.

A research program is required to conduct regular evaluations of potentially viable forest industry operations. Fuelwood exports to the Panhandle, development of laminated lumber products, wood treatment facilities, seedling farms, pulp chipping operations, seed orchards, and some of the newer products such as ethanol extraction, laminated vinyl lumber, and parallam lumber were all mentioned for further study.

The Yukon forests produce excellent seed for export and it seems appropriate that further study be undertaken into the creation of new tree varieties and new forms of stand management. Yukon's seed has been used to develop new tree types in Sweden and the prospects for reciprocal work in Yukon appears interesting.

Research into methods to reduce transportation costs such as utilizing Curragh Resources ships, backhaul transportation on White Pass, use of the Mackenzie River and possibly other transportation methods would assist the industry to identify and possibly reduce costs.

Finally, future development of the forest industry will be constrained if trends in the local and international forestry situation are not monitored. Rapid changes in market opportunities, demand and supply characteristics occur in the international market place. Wars, tariff barriers, currency fluctuations, population changes, and economic activity are just a few of the elements that can seriously shift market demand and supply throughout the world. Only those firms or regions who are constantly aware of the changing market conditions will be able to adjust to the new realities and continue to remain competitive in the market. This is particularly true in smaller "last in–first out" regions like Yukon, where marketing plays a substantial role in maintaining market share. Extensive research must be done to provide the required information to the forest producer and to assist in adjusting to the changes.

1.0 INTRODUCTION

Yukon's forest industry represents a small but important sector of Yukon's economy. While the industry contributes less than one half of one percent to the gross domestic product, the importance of the forest resource to the welfare of the residents of Yukon is far greater than this figure suggests. Historically, the forest played a number of roles in the development of Yukon, providing fuel, shelter, heat, recreation, employment and income for Yukoners. In the future this role is expected to continue and expand as greater use is made of Yukon's forest products.

Development of the forest industry in Yukon is dependent upon the existence of markets that the industry can supply competitively. Identification of such markets is considered to be a very high priority by both industry and government. The general objective of this study is to provide preliminary information to business and government on the market prospects for Yukon's forest products.

The report summarizes the available information on the timber resources of Yukon, reviews the historical and present markets for each of Yukon's forest products and provides an overview of the local and export markets. As well, the report looks at the impact that external factors such as exchange rates and tariffs can have upon these market prospects. Finally, the report provides options on implementing a marketing strategy.

The specific objectives of the paper are:

1. to outline the production and consumption of forest products in Yukon;
2. to identify existing and potential markets for presently produced Yukon forest products, both locally and for export;
3. to determine areas with market opportunities for Yukon forest products; and
4. to provide suggestions on methods to improve industry sales to potential markets.

The report is presented in six sections. This section provides the general introduction to the study, including the purpose and objectives. The subsequent section provides background information on the forest resources of Yukon, its forest operations, and the products produced in the territory.

The third section provides information on the local markets for Yukon's forest products, the competitiveness of Yukon producers in those markets, and the prospects for further development. Although the discussion is focussed on the markets for lumber products and energy from biomass, the markets for pine cones and log homes are also discussed.

The fourth section discusses the export opportunities for Yukon's forest products. These opportunities are focussed on primary export markets which include the Mackenzie Delta, Alaska, the Pacific Rim, and Europe, however, there is also a short discussion of other offshore market possibilities. The export of forest products to southern Canada is technically possible, due to cheap backhaul rates, but the existence of highly competitive suppliers located near this market is expected to forestall exports for all but very large dimensional products.

The fifth section provides an indication of the opportunities for developing products such as pulp and paper, panel board and pulp chips. Finally, the sixth section suggests a marketing strategy to improve sales for the industry and makes suggestions for the development of a distinct marketing emphasis for Yukon.

Data on the consumption patterns for Yukon forest products were not available and estimates were, therefore, constructed from various sources. The methodology used in developing estimates is provided in Appendix I.

2.0 Yukon Forest Resources

The Yukon covers an area of 482 000 km^2 (48.2 million ha) of which approximately 242 000 km^2 (24.2 million ha) is forested[1]. The territory's forests lie within the Boreal forest, and are generally divided into five major sections, namely: the Dawson, Central Yukon, Eastern Yukon, Kluane, and Upper Liard (Figure 1). The Upper Liard, Central Yukon, and Dawson sections support almost all of the forest lands of commercial significance (Rowe 1972).

Within these areas, the river valleys have the most favorable environment for tree growth and it is here that the best timber is found. Rowe (1972) and Gairns (1967) indicated that the merchantable timber stands would also be found at elevations up to 1220 m above sea level in the southern Yukon, up to 610 m above sea level in the central region, and up to 150 m above sea level in Dawson region. Most of the trees lying in the higher elevations are more suited to pulp production than sawn lumber.

White spruce (*Picea glauca* [Moench] Voss) and balsam poplar (*Populus balsamifera* L.) are the predominant species on the alluvial flatlands bordering the rivers in the southern part of the territory. Moving north, the poplar gives way to trembling aspen (*Populus tremuloides* Michx.) and white birch (*Betula papyrifera* Marsh.). Above the flood plains, white spruce, black spruce (*Picea mariana* [Mill] BSP), and lodgepole pine (*Pinus contorta* Dougl.) form extensive pure and mixed stands. Tamarack (*Larix laricina* [DuRoi]) or larch and balsam or sub-alpine fir (*Abies lasiocarpa* [Hook]) are also found at scattered locations throughout the Yukon, the latter usually at higher elevations.

White spruce and lodgepole pine are the most impor-

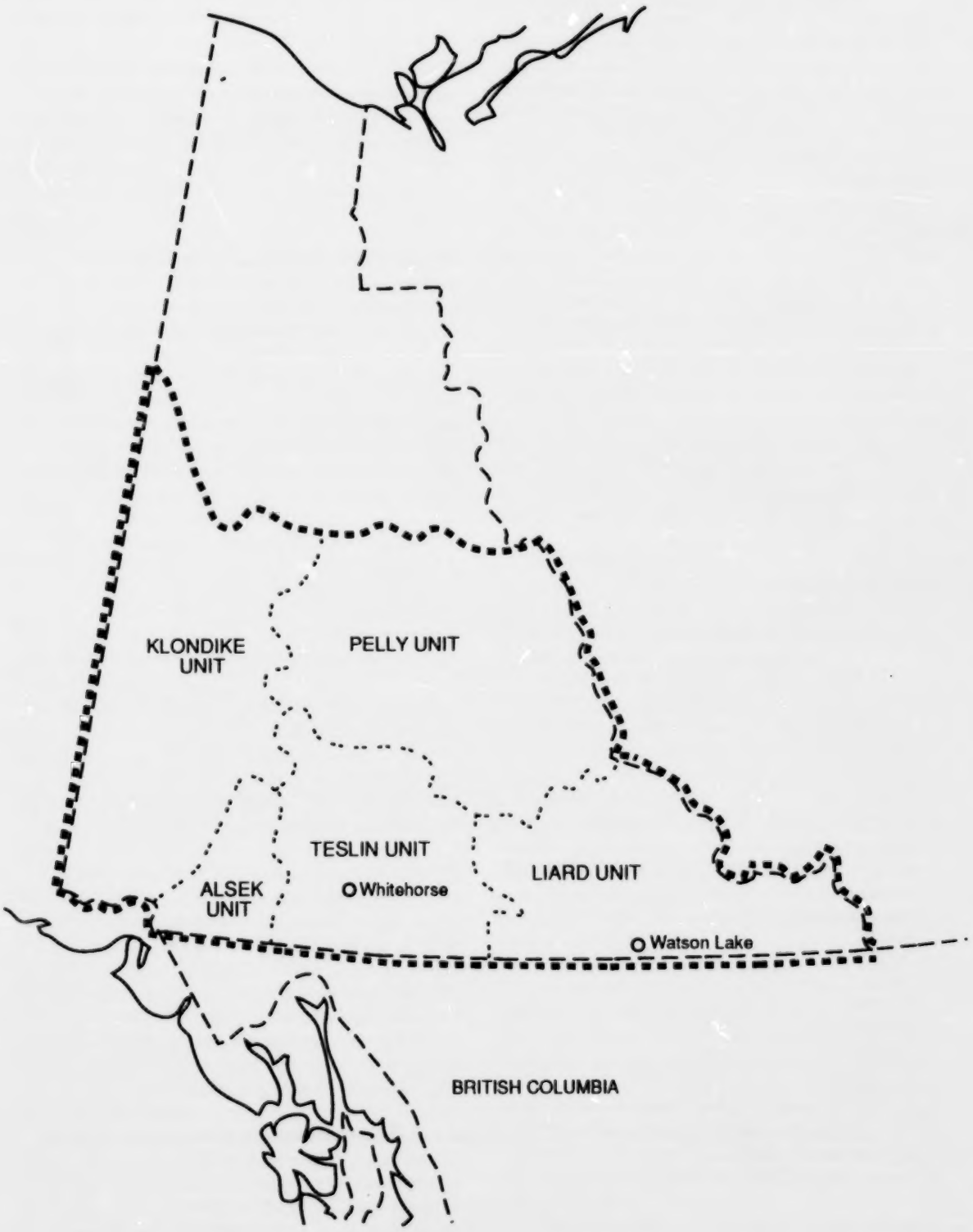

FIGURE 1. Major timber supply areas in Yukon.

TABLE 1. Potential uses of native Yukon tree species

Use	Species						
	Birch	Aspen	poplar	Balsam fir	Alpine Larch	Lodgepole pine	White spruce
Building material							
House logs					x	x	x
Const. lumber					x	x	x
Siding					x	x	x
Waferboard	x	x	x	x	x		
Particleboard	x	x	x	x	x	x	x
Finishing materials							
Boards	x	x		x	x	x	x
Paneling	x	x	x	x	x	x	x
Flooring	x				x	x	
Molding	x	x				x	
Veneer	x	x	x	x	x	x	x
Cabinets	x	x			x	x	x
Furniture components	x	x					
Pulp and paper							
Chips	x	x	x	x	x	x	x
Kraft pulp	x	x	x	x	x	x	x
Thermomechanical pulp	x	x	x	x			x
Newsprint	x	x	x	x		x	x
Agriculture							
Posts					x	x	x
Bedding	x	x	x	x			
Feed		x					
Energy							
Firewood	x	x	x	x	x	x	x
Hog fuel*	x	x	x	x	x	x	x
Pressed–wood logs					x	x	x
Miscellaneous							
Transmission poles					x	x	
Railroad ties					x	x	x
Export cants	x	x			x	x	x
Caskets	x						
Novelties	x						
Speciality items	x	x	x				
Christmas trees				x		x	x
Birch syrup	x						
Perfume/oils	x					x	x

* Hog fuel is sawmill waste not otherwise used: slabs, edgings, trimmings, defective boards, and miscuts that are chipped into small roughly-sized pieces.

tant commercial species in the Yukon. Table 1 lists all the currently recognized uses for Yukon's timber species.

2.1 Productive Forest Lands

To define the total potential for Yukon forest resources, some estimates of productive forest lands and wood volumes are required. Basic forest inventories have been carried out on specific sites in the territory, (Peaker 1968, Hirvonen 1968, Wallace 1970) but no comprehensive forest inventory has yet been completed for the Yukon.

In 1985, the Forest Resources Division of the Canada Department of Indian Affairs and Northern Development in Whitehorse began work on a complete forest inventory. The forest inventory is only partially complete, but preliminary data provided by the forestry staff indicate that there are about 7.3 MM ha of productive forest land in Yukon, with a total volume of 456 MM m^3 [2]. These new estimates place the resource in a much more positive light than previous estimates provided by Bonnor (1982) and Bickerstaff and Honer (1985) who reported that the productive forest lands of Yukon contained about 254.55 MM m^3 of merchantable volume[3].

The most northerly areas of British Columbia also provide merchantable timber that can be economically harvested and these areas should be considered part of the supply for Yukon firms. Watson Lake operators have used wood supplies from the Atlin, Dease-Liard, Liard, and parts of the Iskut supply blocks in northern British Columbia for some years.

The total available merchantable timber in the Atlin, Dease-Liard, and Iskut supply areas is estimated by the British Columbia Ministry of Forests to be 16.583 MM m^3 and the merchantable timber supply in the Liard supply block is estimated to be 20.0 MM m^3. Figure 2 outlines the areas that define Yukons supply areas for merchantable timber.

Yukon firms have a potential log supply of 492.6 MM m^3. While the numbers may appear large, this resource is small in relation to the resource supply in the rest of Canada. Table 2 shows that Yukon's productive forest base is larger than that for PEI and Nova Scotia but substantially smaller than that available in the other regions, particularly the major wood producing provinces of British Columbia, Ontario, and Quebec. Yukon's contribution to total available wood volume amounts to only 2.6% of the British Columbia volume and less than 1.1% of the total for Canada.

While the size of the potential forest resource is important, the Annual Allowable Cut (AAC) provides the real indicator of the maximum supply of logs available for harvesting by the industry over the longer term. The costs of production and available markets faced by firms exploiting the resource will, of course, determine the economical cut for the industry.

In the Yukon there is presently no formal AAC figure distributed to the industry. The most recent estimate of an AAC (Gairns 1967) proposed an AAC sufficient to produce 223 080 m^3 (54 MM fbm) of lumber and 550 M tons of bleached sulphate pulp (or 1 MM tons of newsprint). For planning purposes, this appears to provide a reasonable and conservative estimate of the potential supply in Yukon, pending results of the Federal government's comprehensive forest inventory[4]. In British Columbia, the Ministry of Forests has set the AAC for lands in the Atlin, Dease-Liard, and northern Iskut areas at 181 300 m^3/yr and in the Liard area, the AAC is set at 225 000 m^3/yr.

In summary, the total available log supply amounts to 629 300 m^3/yr for Yukon firms and represents the maximum potential market size firms should consider exploiting. Using a conservative lumber recovery of 185 fbm/m^3 of log input taken from the Deloitte, Haskins, and Sells (1986) report, the total lumber market size would amount to 116.42 MM fbm. To place this in perspective, it amounts to 0.55%, or one half of one percent of the total British Columbia lumber production in 1986.

2.2 Development Potential

The potential for Yukon's forest products depends to a large extent upon the size of the available resource base, however, it also depends upon the species, maturity, volume, and quality of that resource base.

Yukon has two commercial species, namely, white spruce and lodgepole pine. These species represent 80% and 15% respectively of the total productive volume, with the remaining 5% of the volume being split amongst the other species. As Table 1 confirms, this species combination allows Yukon firms to produce a broad variety of products including logs, construction materials, finishing material, pulp and paper feedstock, and biomass energy (firewood, hog fuel, and pressed wood logs). The industry can also produce a limited amount of furniture stock from pine, and some specialty products such as perfume, animal bedding, and feed.

Maturity determines the urgency with which the resource needs to be harvested in order to preserve the long term development potential of the resource and, in part, defines the prospects for the log markets in Yukon. Bickerstaff and Honer (1985) reported that 18% of Yukon's productive forest land could be classed as mature timber, or timber ready for harvest, with the remaining 82% classed as immature. This result contrasts sharply with the evidence he provided in the Northwest Territories, Alberta, and Interior British Columbia, where the majority of volume is mature timber.

The Bickerstaff analysis suggests that, unlike many neighboring regions, there is no pressing urgency to

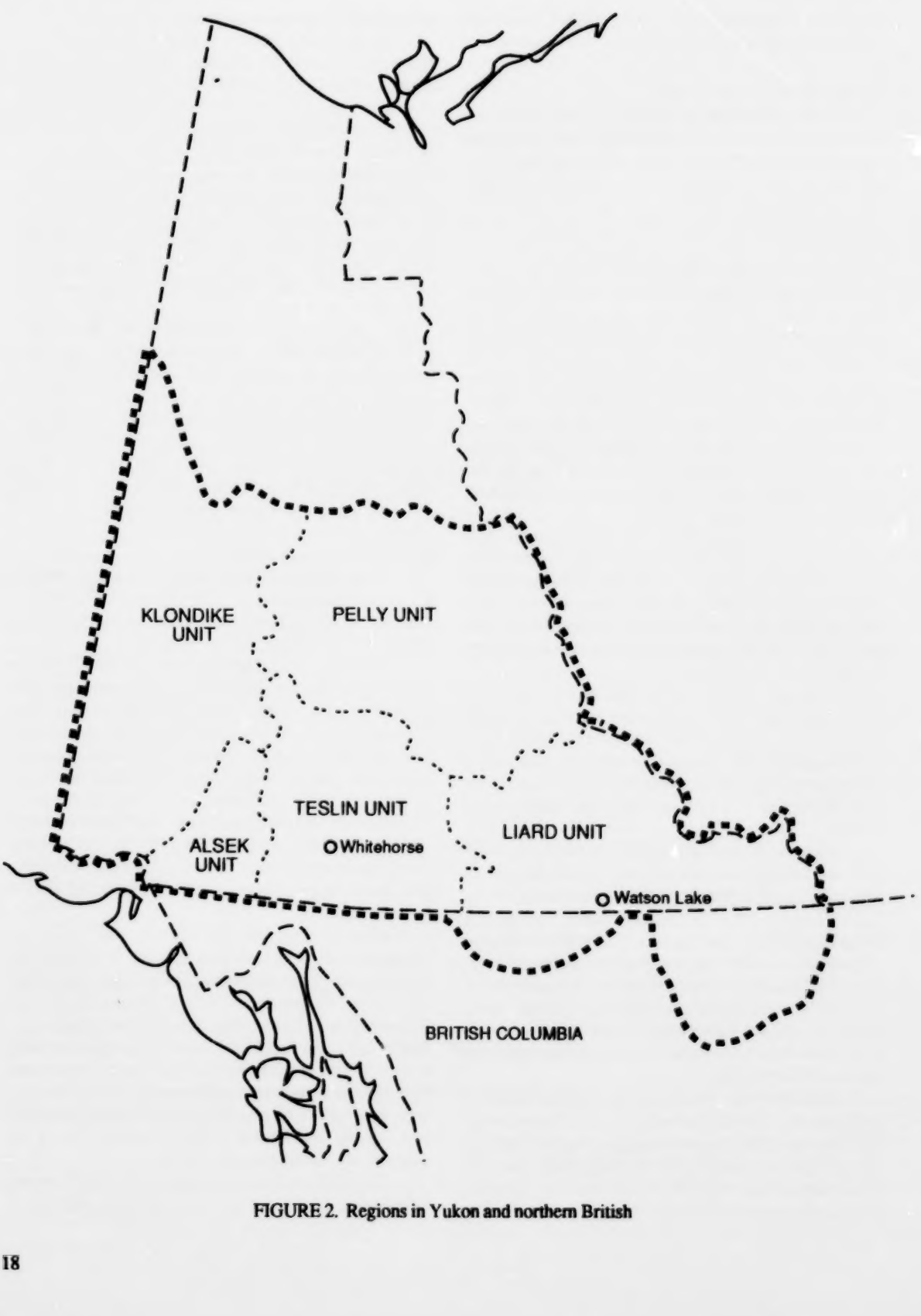

FIGURE 2. Regions in Yukon and northern British

TABLE 2. Growing stock, areas and volumes of forests available for timber production, 1981

Province or territory	Land area for timber production[1]					Gross merchantable volume on stocked land				Average yield on stocked land		
	Total	N.S.R.	Undetermined	Natural forest	Man-made[6] forest	Stocked forest	Softwood[8]	Hardwood[9]	All species	m^3/ha	%Softwood	%Hardwood
	1,000 000 ha						1,000 000 m^3					
Newfoundland	8.35	0.47	—	7.86	[0.02]	7.88	428.89	34.11	463.00	58.7	92.6	7.4
Nova Scotia2	2.89	0.04	—	2.83	[0.02]	2.85	136.86	65.60	202.46	71.1	67.6	32.4
Prince Edward Island3	0.29	0.04	—	0.24	[0.01]	0.25	22.23	11.10	33.32	134.4	66.7	32.3
New Brunswick	6.17	0.29	—	5.81	[0.08]	5.89	337.58	178.34	515.92	87.7	65.4	34.6
Quebec	53.28	4.40	—	48.56	[0.31]	48.87	3 089.28	1 043.53	4 132.81	84.6	74.8	25.2
Ontario4	36.82	3.74	—	31.88	[1.20]	33.08	2 074.72	1 122.88	3 197.60	96.7	64.9	35.1
Manitoba	13.62	1.80	—	11.75	[0.08]	11.83	438.58	195.80	634.37	53.6	69.1	30.9
Saskatchewan	7.95	0.59	—	7.18	[0.18]	7.36	293.47	190.55	484.02	65.7	60.6	39.4
Alberta	20.41	5.77	—	14.47	[0.18]	14.65	964.91	579.82	1 544.73	105.5	62.5	37.5
British Columbia5	50.77	2.97	0.76	46.27	[0.78]	47.05	9 131.88	496.06	9 627.95	204.6	94.8	5.2
Yukon Territory[7]	6 73	1.80	—	4.93	—	4.93	214.63	39.92	254.55	51.7	84.3	15.7
Northwest Territories[7]	13.76	0.02	—	13.74	—	13.74	314.71	130.87	445.58	32.4	70.6	29.4
Canada[10]	221.03	21.91	0.76	195.50	[2.86]	198.36	17 447.74	4 088.58	21 536.31	108.6	81.0	19.0

NOTES:

1. Bonnor (1982) and Provincial Forest Agencies.
2. Excludes Cape Breton Island
3. Includes abandoned agricultural land.
4. Excludes southern Ontario below 45° Latitude
5. Includes Tree Farm Licenses.
6. Estimates in square brackets based on Cayford and Bickerstaff, 1968.
7. Most burned lands and NSR lands were classified as unproductive forest land in 1980 reconnaissance inventory.
8. Softwoods
9. Hardwoods
10. Totals may not add due to rounding.

Source: Bickerstaff, A. and Honer, T.G. (1985),

initiate large scale forest harvesting or promote log exports in order to ensure the long term quality of the resource base. Many smaller areas have overmature timber that should be harvested, and once the forest inventory is completed, priority can be given to cutting in these areas.

The volume characteristics of Yukon forests are another important consideration. The diameter, length, and taper of Yukon trees will affect the variety of products that can be taken from each tree, the amount of residue that will be generated, and the amount of wood that can be obtained per unit of logging effort.

Yukon forests predominantly contain first-growth small diameter trees. Gairns (1967) and Sampson et al.(1987), concluded that more than 80% of the commercial species (spruce-pine) in Yukon are less than 26 cm in diameter. Grenier (1982) also provided evidence that Yukon had more than 88% of trees that were in the range 10 to 22 cm.

Volume characteristics affect the variety of products that can be produced. The smaller size of Yukon trees reduces the variety of products that can be produced. Table 3 shows that as the diameter increases, firms are able to produce higher value finishing boards (clears), and larger quantities of #2 or better grade of dimensional lumber, as well as basic construction grade materials. On the other hand, smaller diameter spruce logs provide for a consistent recovery of good construction lumber. For Yukon firms, the percentage of clears and high value materials is likely to be less than 5% of the lumber recovered and firms must take special care to ensure that these materials are identified.

Pine logs tend to produce more knots and the product quality and lumber recovery for construction materials is lower throughout all sizes. However, Plank (1979) indicated that the percentage of higher quality products from lodgepole pine can be significantly increased if the production processes are geared to maximizing product yield rather than maximizing the quantity of dimensional lumber produced.

By contrast, coastal British Columbia and Alaska produce large diameter Douglas-fir and hemlock. Table 4 shows that these species produce predominantly high quality boards and #2 or better building materials.

Volume characteristics affect the average amount of residue remaining after the production process. As the tree diameter increases, there is more volume available to create sawn lumber and more target area from which to cut the optimal combination of sawn lumber products. Therefore, as diameter increases, the percentage of wood residues decline and product value increases (Table 4). This fact is significant as it focuses on the importance of finding markets for wood residues, especially wood chips, if operators hope to obtain maximum revenue from each tree.

Volume characteristics also affect the amount of effort required per unit of output. McBride (1963) demonstrated that forty 15 cm trees had to be harvested for each 1 M fbm of lumber produced while it took only seven 38 cm trees to produce the same amount of lumber. And he showed that it took 5.6 person hours to produce 25 M fbm of lumber using 15 cm logs and 2.2 person hours to produce the same 25 M fbm in lumber using 38 cm logs. With Yukon's smaller logs, this means Yukon firms must harvest more trees to achieve the required lumber and must face the prospects of higher potential costs for the harvesting of those trees. It also reiterates the need for Yukon firms to find methods to produce revenue from every portion of each tree harvested.

The quality of Yukon logs is also a key element in determining the markets to which sales efforts should be directed. Several government officials and forest operators commented during the study that Yukon's wood had superior qualities of strength and visual appearance that made it a desirable product for marketing. In general, the previous site specific forest inventories in the Yukon confirm that the quality of the white spruce and lodgepole pine is excellent. The trees tend to have few pest problems, lower incidence of decay, and less loss in volume associated with decay. Unfortunately, no studies have been done to date to confirm or deny this contention. Moreover, no studies appear to have been done to evaluate any potential quality problems, such as "shake".

Shake is the longitudinal splitting of lumber which occurs when stresses, built up in the standing trees, are released as the wood is sawn and dried. If shake exists it can reduce the lumber grade and profitability of the firm. Shake is difficult to assess until the timber is sawn into lumber and dried, but was found in significant quantities in the Liard Valley by W.R. Dempster and Associates in 1986.

2.3 Manufacturing Capacity and Production

In order to have a framework for discussing the potential markets for Yukon forest products it is important to have an understanding of the industry and its capacity to respond to market demand. A companion report on the forest industry in the economy of the Yukon, (Heartwell 1987) provides a detailed profile of the forest industry while this section provides a basic summary of the industry.

The forest industry in Yukon is diverse, with firms engaged in primary production including logging, fuelwood harvesting, and pine cone picking, and in processing including sawmilling, roundlog production, and wood manufacturing[5]. Table 5 provides an outline of some of the major indicators of economic activity in the industry.

In 1986/87 there were 14 logging contractors

TABLE 3. Spruce lumber grade recovery from natural-sized logs shown as a percentage by grade in 7.6 cm classes

Lumber grades	Diameter classes (Mid-point diameter [cm])						
	15.2	22.9	30.5	38.1	45.7	53.3	61.0
D&BTR. Clear	0.00	0.00	1.00	1.00	2.00	3.00	6.00
#2& BTR. Com.	9.00	21.00	25.00	26.00	24.00	20.00	14.00
#3 Common	84.00	73.00	68.00	66.00	63.00	62.00	62.00
#4 Common	7.00	6.00	6.00	7.00	10.00	15.00	18.00
#5 Common	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: McBride 1963.

TABLE 4. .Lumber grade recovery as a percentage of surface-dry lumber tally for logs from lodgepole pine, white spruce, Douglas-fir, and hemlock

Tree species	Products						
	Clear	No. 2	No. 3	No. 4	No. 5	Stud	Total
	(Percentage)						
Lodgepole pine							
Study 1	1.22	0.84	5.32	1.56	0.08	90.99	100.00
Study 2	13.00	52.00	25.00	6.00	4.00	0.00	100.00
Study 3*	0.00	65.00	29.70	5.00	0.30	0.00	100.00
Study 4	1.00	42.00	49.00	8.00	0.00	0.00	100.00
White spruce							
Study 1	7.40	— 35.20 —		— 8.45 —		49.95	100.00
Study 2	2.00	62.00	9.00	20.00	7.00	0.00	100.00
Study 3	2.00	20.00	68.00	10.00	0.00	0.00	100.00
Douglas-fir							
D-Grade**	34.60	41.90	21.30	2.30	0.00	0.00	100.00
Y-Grade***	4.10	34.50	43.80	17.60	0.00	0.00	100.00
Hemlock							
D-Grade**	63.50	32.90	3.60	0.00	0.00	0.00	100.00
Y-Grade***	7.40	59.50	27.20	5.90	0.00	0.00	100.00

Source: Plank 1979 and 1984; Middleton *et al.* 1985; McBride 1963 and Sampson *et al.* 1987.

* The 1986 Plank study did not have data on clears.
** D-Grade logs are amongst the highest quality available in B.C.
*** Y-Grade logs are the lowest quality of fir log.

active in the Yukon, along with 25 commercial fuelwood firms, 7 pine cone contractors, 6 log home builders, and 13 wood manufacturers. There were 25 commercial sawmills in the Yukon in 1986/87, while only 17 firms were actively engaged in producing sawn lumber products. There are few firms that dominate their respective sector. For many of these firms, forest product manufacturing is only one component of a livelihood based on two or more seasonal occupations.

Forest operations are spread throughout the territory with the majority of firms operating in the Whitehorse and Watson Lake regions (Figure 3). The operators tend to be long-term Yukoners providing jobs and income to a broad range of citizens in communities throughout the territory.

Total forest production in 1986/87 was 140 851 m^3. Of this 38 754 m^3 (27.7%) was produced by the sawmill sector, 98 086 m^3 (70.0%) by the domestic and commercial fuelwood sector, and 4011 m^3 (2.3%) by the roundwood sector. Pine cone producers added 2170 hectolitres of pine cones to the industry[6].

Total production varies considerably between market areas. Watson Lake and Whitehorse were the largest producing areas accounting for 12.2% and 56.6% respectively, while the remaining production was spread almost equally amongst the other rural communities (Table 6). The productive potential, or installed capacity, of Yukon's forest industry provides an important indicator of the in-place potential of the industry to supply products to various markets.

Data could only be found for the sawmill industry. Table 7 provides information on the engineered capacity for the various types of mills in the Yukon. Engineered capacity ranged from 66 M fbm/8-hr shift for mills producing <100 MM fbm/yr to 110 M fbm/8-hr shift for the large mills. The mills had unused capacity of 190 M fbm/8-hr shift. The total potential production from the industry on a one-shift basis was 57.2 MM fbm. However, the industry was producing at less than 20% of that potential in 1986/87[7]. This operating level is far less than similar mills in western Canada, where the average utilization was over 50% of capacity (Heartwell 1987).

Realistically, it is unlikely that the Yukon mills producing <100 M fbm/yr will reach 100% of their capacity, but it would not be unreasonable to expect them to reach 55% of capacity or 11.6 MM fbm annually. The large mills can potentially produce up to 30 MM fbm/yr. This creates a total potential supply of 41.6 MM fbm annually. This total is much less than the AAC of 223 080 m^3 (50-60 MM fbm) estimated by Gairns (1967) and should pose few overall problems for forest management. Undoubtedly, there will be site specific management questions as the harvesting will be concentrated in a few areas, at least initially.

The fuelwood industry presently uses firekilled materials or wood residue. Fuelwood harvesting utilizes materials that would otherwise be wasted and, therefore, is only restricted by the economics of supplying the product to the consumer.

Roundwood operators supply a small and specialized market. They use small amounts of wood and can expand capacity as required to meet the limited demand. This sector has been stable since the turn of the century and is expected to produce about 4 M m^3 annually for some years to come.

3.0 Forest Products Markets Within Yukon

The market for forest products consists of a series of separate markets, one for each of the major forest products produced by the industry. It is important to determine the demand for these products in each market, the future trends, and the ability of Yukon firms to successfully compete.

Moreover, consumer demand for forest products in each market is a derived demand. That is, demand depends on the product price, the price of substitute products, consumer tastes, and the economic activity of the market area, such as gross domestic product, income, population, government policies, and employment. For export markets, the demand depends upon the economies of these nations and the tastes and preferences of the foreign consumers.

This section of the report discusses the potential of Yukon firms to penetrate the Yukon forest products market, with emphasis on goods Yukoners presently produce. Biomass products (solid and chip fuelwood), sawn lumber products (dimensional lumber, timbers, boards), and other products (pine cones) are discussed in detail.

The local forest products markets are the ones of highest priority for most local producers. The long transportation distances to Yukon, and the more isolated nature of many Yukon communities, provide an effective tariff barrier to products imported from the south. Consequently, local forest producers should be able to provide competitively priced products even with less efficient production processes available to them. Hence, it is most important to concentrate the efforts of the forest industry on identifying and fully exploiting the local market potential.

3.1 Energy Products

Solid fuelwood for space heating of domestic homes is a well established market in Yukon[8]. Consumption has been quite high on a *per capita* basis, having grown slowly

TABLE 5. Key forest industry characteristics for 1986/87

Forest Section	No. of firms	Employment (PM)	Production (PY)	Quantity	Value ($ 000)	Total Wages and Salaries ($ 000)	Average Income Per Person Year ($ 000)	Capital Investment ($ 000)
Logging	14	161.0	13.4	38,754.00 m^3	574.63	283.26	21.12	1100.00
Sawmilling	17	146.1	12.2	6841.60 M fbm	1553.05	279.00	24.00	2902.00
< 100 M	8	22.2		310.00 " "	93.30	57.20	24.00	728.00
100M –1MM	7	60.9		2454.00 " "	461.72	150.00	24.00	716.50
> 1 MM	2	63.0		4077.60 " "	998.03	55.00	24.00	702.00
Comm. Fuelwood	25	753.0	62.8	68170.00 m^3	2257.78	1016.55	16.20	400.00
Misc. Roundwood	6	42.0	3.5	4011.00 m^3	140.85	57.60	19.20	250.00
Pine Cones	7	72.3	6.3	2170.00 hl	173.60	43.94	7.32	100.00
Wood Mfg.	13	272.0	22.7	na	na	522.24	23.04	na
TOTAL	82	1446.4	102.9		3984.43	2202.59	18.70	4752.00

SOURCE: Forest Industry Survey, DIAND–YUKON (files and records)

NOTE: See Appendix I for notes

Table 6. Yukon forest harvest (m^2) by region – 1980/81 – 1986/87

Year	Beaver Creek				Carmacks				Dawson City			
	Sawlogs	Fuelwood	Houselogs	Total	Sawlogs	Fuelwood	Houselogs	Total	Sawlogs	Fuelwood	Houselogs	Total
1980/81	1487.3	96.9	0.0	1584.2	2117.2	4529.4		6646.6	2777.9	1709.5		4487.4
1981/82	1553.0	507.5	0.0	2060.5	566.0	4672.5	275.0	5513.5	2001.0	2590.6	278.0	4869.6
1982/83	500.0	245.6	0.0	745.6	512.9	9035.1	240.2	9788.2	1692.6	3899.1	427.4	6019.1
1983/84	0.0	156.3	0.0	156.3	1460.0	5611.5	265.8	7337.3	2200.0	2126.9	495.4	4823.2
1984/85	0.0	117.5	0.0	117.5	736.0	3372.5	122.3	4230.8	2200.0	1911.4	288.6	4400.0
1985/86	1855.0	140.0	0.0	1995.0	2109.7	7595.0	432.0	10 136.7	5345.7	1419.0	23.0	6787.7
1986/87	na	na	na	na	na	na	na	na	na	na	na	na

	Haines Junction				Laberge				Mayo			
	Sawlogs	Fuelwood	Houselogs	Total	Sawlogs	Fuelwood	Houselogs	Total	Sawlogs	Fuelwood	Houselogs	Total
1980/81	34.0	1863.6		1897.6	766.0	13 154.7		13 920.7	2679.6	1396.3		4075.9
1981/82	151.0	2731.9	351.0	3233.9	2413.0	21 030.0	2668.0	26 111.0	1100.0	1741.9	894.0	3735.9
1982/83	0.0	3962.6	2527.0	6489.6	1179.3	55 784.5	932.1	57 895.9	180.0	1651.7	168.4	2000.1
1983/84	200.0	3747.0	443.1	4390.1	1649.0	49 287.4	1074.7	52 011.2	1872.0	1337.5	122.2	3331.7
1984/85	2578.0	3071.1	422.3	6071.4	2304.0	39 251.0	494.0	42 049.0	8756.0	1765.0	30 272.0	40 793.0
1985/86	0.0	4874.0	167.0	5041.0	2488.0	45 909.0	866.0	48 444.0	5045.0	1563.0	169.0	6777.0
1986/87	na	na	na	na	na	na	na	na	na	na	na	na

	Ross River				Tagish				Teslin			
	Sawlogs	Fuelwood	Houselogs	Total	Sawlogs	Fuelwood	Houselogs	Total	Sawlogs	Fuelwood	Houselogs	Total
1980/81	317.5	2329.9		2647.4	2990.0	4056.6		7046.6	1262.9	1216.4		2479.3
1981/82	520.0	651.3	20.0	1191.3	1645.0	4617.5	633.0	6895.5	2282.0	1665.0	207.0	4154.0
1982/83	510.0	1641.9	41.9	2193.8	3242.0	8088.4	806.7	12 137.1	1970.0	1725.0	111.1	3806.1
1983/84	0.0	1632.5	113.9	1746.0	4765.0	6121.6	1634.0	12 520.6	1220.0	1942.5	140.5	3303.0
1984/85	0.0	1556.9	37.1	1594.0	6986.0	7841.4	1755.2	16 582.6	1400.0	1296.3	15.1	2711.3
1985/86	0.0	708.0	36.0	744.0	4431.0	6656.0	783.0	11 870.0	350.0	2788.0	178.0	3316.0
1986/87	na	na	na	na	na	na	na	na	na	na	na	na

Table 6. Continued

	Watson Lake				Total			
	Sawlogs	Fuelwood	Houselogs	Total	Sawlogs	Fuelwood	Houselogs	Total
1980/81	8168.2	675.0		8843.2	22 600.6	31 028.3	3698.8	57 327.7
1981/82	1994.0	1041.3	97.0	3132.3	14 225.0	41 249.5	5423.0	60 897.5
1982/83	4020.0	3265.0	383.5	7668.5	13 806.7	89 298.9	3136.3	106 241.9
1983/84	0.0	2179.4	202.7	2382.1	13 366.0	74 143.6	4492.2	92 001.8
1984/85	39 178.5	828.8	1419.7	41 426.9	64 188.5	61 011.8	4584.6	129 784.8
1985/86	9043.6	2758.0	1404.0	13 205.6	30 668.0	73 591.0	4058.0	108 317.0
1986/87	na	na	na	na	38 754.0	98 086.0	4011.0	140 851.0

Source: Forest Resources Division, DIAND – Yukon

FIGURE 3. Locations of Yukon sawmill operations.

TABLE 7. Total estimated capacity for Yukon sawmills based on 1986/87 production levels

Annual production	Number of mills	Total engineered capacity/ 8-hr. shift	Total annual capacity
Idle	8	190 000	11 400 000
Less than 100 000 fbm	8	66 000	3 900 000
100 000 fbm to 1 MM fbm	7	166 000	19 920 000
1 MM fbm and More	2	110 000	22 000 000
Total	25	532 000	57 220 000

Source: Northern Affairs–Yukon, Department of Indian and Northern Affairs-Canada.

Note: Total capacity is based upon an operating season of 60 days for mills that are idle or produced less than 100 000 fbm in 1986/87, 120 days for mills producing 100 000 to 1 MM fbm, and 200 days for mills producing more than 1 MM fbm.

in Yukon's stable rural communities over the past decade, suggesting a long term preference for wood heat. Also, in Whitehorse, there has been a rapid annual growth (10.7%) over the same period as oil prices climbed and government energy conservation programs assisted in convincing residents to convert from oil to wood heat. However, fuelwood consumption for domestic heating has begun to stabilize in Whitehorse indicating that the demand is being satisfied.

Precise consumption data are not available and, consequently, estimates were used for the study. Using 1986 Census Canada data and estimates of average per dwelling consumption, the total potential market is estimated to be 129 221 m^3 (57 001 cords). Local officials of the Yukon and Canada Energy and Mines organizations concur that there is almost complete conversion in rural communities where fuel costs are very high, but complete conversion from oil to wood is not likely in Whitehorse. Using estimates of conversion potential provided by various sources, the total maximum demand was revised downward to 77 532 m^3 (34 214 cords) (Appendix I).

Fuelwood[9] production permits accounted for 98 048 m^3 (58 852 cords) in 1986/87, indicating that supply is meeting or exceeding demand in the domestic heating market. Further increases in supply, therefore, can only be met through overall increases in the size of the market.

Future growth depends largely on population increases rather than further conversion. It is estimated to increase by 4900 m^3 (2941 cords) in 1988 and rise to 108.9 m^3 (65 366 cords) by 1991 (Figure 4).

Faro is the only community in Yukon where there appears to be prospects for market penetration for domestic space heating. Faro has historically been a company town in which the mine used fuel oil and paid all energy costs. Government too, used fuel oil extensively and only a few private homes converted to wood. As such, less than 100 cords of wood were consumed annually by local citizens.

Today, however, the majority of the homes and business properties in Faro are privately owned and individual owners are now responsible for their space heating. With fuelwood costs being less than alternative fuels, there is likely to be a significant shift to fuelwood. If the estimate of 2.16 cords *per capita* is used, then the total demand in Faro could be approximately 2160 cords for a population of 1000.

While domestic demand for fuelwood will grow more slowly in future years, it will still provide a steady component of the industry. Fuelwood is likely to maintain very favorable price advantages. In 1987 fuelwood cost $5.47/MBTU while fuel oil cost $16.80/MBTU.

Table 8 shows that fuelwood prices in real terms have risen only modestly in the past sixteen years, up only $5.00/cord, from 19.00/cord in 1971 to $24.00/cord ($1971) in 1987 excluding inflation[10]. Future fuelwood price increases are expected to be modest, averaging less than 2% per annum.

Fuelwood prices are likely to remain low due to the profitability and competitiveness of the sector. Loeks (1985) showed that production costs were about $45/cord while sales revenue amounted to $75/cord. This left a healthy 38% gross margin to cover costs for administra-

TABLE 8. Fuelwood prices in Whitehorse

Year	Nominal price	Constant[1/] price (1971 $/cord)
1971	19.00	19.00
1972	20.00	19.10
1973	24.00	21.54
1974	27.50	22.70
1975	35.00	26.27
1976	35.00	23.65
1977	40.00	24.71
1978	40.00	22.98
1979	40.00	21.48
1980	42.00	20.85
1981	42.00	18.55
1982	45.00	17.61
1983	60.00	22.05
1984	60.10	21.29
1985	69.40	23.76
1986	75.00	24.83

Source: Forest resources officials - DIAND (Yukon)
(M. Fajrajsl, D. Morgan, N. Denmark)

[1] Data in the constant dollar column was deflated by Statistics Canada Consumer Price Index for Fuel and Utilities.
[2] Fuelwood prices are based upon the commercial price for solid fuel in 2 ft. lengths. Prices for 4 ft and 8 ft. lengths are usually $10–$15 less per cord.

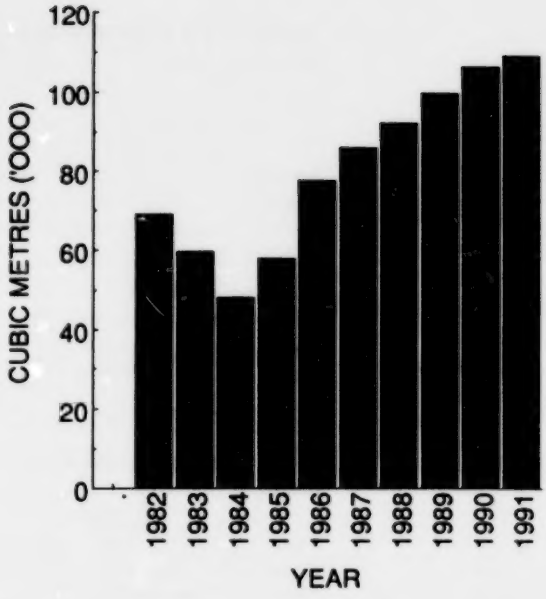

FIGURE 4. Domestic fuelwood demand.

tion, taxes, depreciation, risk, and profit. Moreover, the sector requires a minimal capital investment (<$10,000). This encourages entry and greater price stability.

Fuel oil prices, on the other hand, are expected to rise quickly as most price forecasts show rapid rises in production costs in the nineties. The price of alternative fuels, such as oil, are expected to rise at a rate of 3–4% per annum, giving a clear market advantage to wood sales for the medium term.

Wood residue or hog fuel has been suggested as an alternative fuel for domestic consumption. However, wood residue fuel is not likely to penetrate the domestic market to any great extent. Consumption levels in the domestic space heating market are leveling off, and the present demand is being met by highly competitive solid fuel suppliers. Moreover, Manecon Partnership (1984) in a wood conversion study in the Northwest Territories, concluded that wood chipping is not likely to be price competitive with solid wood fuel suppliers. Production costs were more expensive for chips than solid fuel and would require a market price of at least $7/cord more than the present Yukon solid fuel market prices in order to maintain profitability.

Other problems exist that will prevent wood residues from penetrating the domestic market. First, many consumers have already converted to stoves using solid fuel and would be reluctant to convert again to a new stove that could accommodate wood chips. Second, wood chip-approved stoves are not readily available for installation. And finally, wood chips require special handling and storage facilities increasing non-market costs to the consumer.

While domestic space heating with solid fuelwood may be approaching its market potential, there appears to be significant opportunity for converting industrial space heating from oil to wood. At the present time data are not available on the number of industrial consumers of fuelwood but indications from government officials are that there are relatively few throughout the Yukon. Pelly Crossing heats its school by wood and several smaller businesses throughout the territory use fuelwood, but the market share of wood is likely less than 1%.

The precise size of the industrial market is unknown but estimates from recent studies (Hodge and Erhlich 1979, and Schaffer 1987) place the total energy requirement for commercial and industrial applications at 2.02 gigajoules or 112 200 cord equivalents (254 076 m^3). This gives the fuelwood sector a potential industrial market that is more than twice that of the domestic space heating market.

The importance of conversion to local Yukon products cannot be underestimated. If full conversion were to occur, territorial consumers would save $26.2 million in fuel oil costs, while Yukon forest businesses would earn revenues of $9 million. Even if a modest 15% of the total market can be converted to wood, the territory stands to save $3.93 million in fuel oil while Yukon firms would earn $1.346 million annually[11].

Discussions with energy conservation officials during this research project indicated that it would be difficult to convert Yukon industrial users directly to wood heat due to the lack of space to accommodate the woodstoves, storage and handling difficulties, pollution problems, inconvenience in constant fueling of the stove to maintain proper temperature and high insurance rates with the wood stove. Until recently, government reluctance to convert their buildings to wood heat may have also contributed to making it difficult to stimulate wood residue sales, in that it may have undermined public confidence in the product.

While direct conversion to wood heat is likely to be difficult in the industrial sector, there does appear to be significant opportunity to use solid fuelwood or wood residues as part of a central hot water heating system for industrial users. Wood chips and other wood residues have a distinct advantage in the area of industrial space heating and thermal generation. These products are easily transported and stored and can be used efficiently in the production of hot water at a cost that is equal to or less than substitute products such as fuel oil.

The use of central wood-based heating systems has proven technically feasible in Alaska where test burns have already taken place at two armed forces facilities. As well, a Fairbanks firm is presently in the process of establishing a $4 million wood-residue-based steam plant intended to provide heat and power to the community.

Klondike Heating Co. Ltd. is the first commercial operator to obtain a contract to provide a central heating system in the Yukon. The company signed a long term contract with the Yukon Government in May, 1987 to supply heat to the Yukon Justice building. The firm will use approximately 600 tonnes (4 M m^3) of woodchip material per year in order to provide heat to the Yukon Justice building and several businesses in the proximity of that building.

Under the contract, the Yukon government will pay for BTU's consumed at a rate of 90% of the cost of fuel oil. This means the government saves directly from the lower fuel costs and indirectly by receiving 100% of the heat value rather than 75% of the heat value that is derived from the less efficient oil furnaces.

The Yukon College has installed a heating system capable of burning more than 750 tonnes (5 M m^3) of wood chips and residue each year. Feasibility studies are also underway to investigate the possibilities of installing wood-based hot water heating systems in Haines Junction and Faro. For planning purposes, it seems realistic to expect that fuelwood will grow to take 15% of the industrial market in the next five years for a total of 38 118 m^3 (16.3 M cords).

The use of wood chips and other wood residue such as sawdust and bark will help establish a market for sawmill waste. This will provide new revenue for sawmills and help to improve the profitability of existing forest operators. As well, it allows Yukon firms to improve their competitiveness with British Columbia companies by reducing the effective cost of logs at the mill.

Peschke (1986) mentioned several firms that produce wood waste energy systems that could be of use in Yukon. Firms such as Energex, Wellons, Inc., Ray Burners Company, Konus Anga and Vaerma, and APSCO Engineering Ltd. have installed small plants in various parts of the world. Efforts should be made to attract firms to invest in the Yukon and undertake studies to determine methods to improve the industrial use of wood heat.

Given the value of industrial heating, government has a strong incentive to undertake market research to look at methods for dramatically improving the conversion from oil-based to wood heating systems. Greenhouses, new hot water distribution systems, thermal generation, and other cogeneration possibilities should be aggressively explored under the Yukon Energy Alternatives Program. Both private and public initiatives should be encouraged.

3.2 Sawn Lumber Products

Yukon forest operators produce most of the standard lumber products, including dimensional lumber (2x4s, 2x6s, etc), boards, poles, timbers and roundwood[12]. In 1986/87 all of these products were produced and sold either green or air dried. One firm, Hyland Forest Products, graded its material to national quality standards.

The demand for lumber products in Yukon, has been cyclical due to the small narrowly-based economy. The local market for lumber products has fluctuated between a high of 20.4 MM fbm in 1979/80 and low of 10.4 MM fbm in 1983/84. The average annual consumption has been 15.3 MM fbm (Figure 5). In 1986/87, consumption of lumber products was estimated to be 18.9 MM fbm. Details on the estimates are provided in Appendix I.

Yukoners consume both spruce-pine-fir (SPF) products and Douglas-fir/hemlock products and the total consumption figures reflect this fact. N. Springate and Assoc. (1979), Hakai Forest Products Ltd. (1984), and Bohning (1986) reported that 79% of the northern market is for SPF and 21% for Douglas-fir lumber products. Local Yukon lumber distributors confirmed this division in the total

market. On this basis, the total demand for SPF products is about 14.91 MM fbm in 1986, with the longer term average demand being about 12.3 MM fbm annually.

To determine the ability of Yukon operators to establish market dominance locally, it is necessary to have information on the market size and its characteristics.

Table 9 provides information on forest products consumption by product type. The table shows clearly that standard dimensional lumber for building construction dominates the lumber products market. Almost two thirds of the total consumption (63.3%) is for standard dimensional lumber products (2x4, 2x6, 2x8). A further 12.1% is for larger dimensional lumber (2x10, 2x12), while board material represents 10.0% of total consumption. This leaves only 14.6% of the market for logs, timbers, siding, and flooring.

Kiln-dried lumber dominates the sales of dimensional lumber, with less than 600 M fbm of green or air-dried lumber being purchased. The dominance of the market by kiln-dried products is important as it shows a very strong consumer preference amongst Yukoners for such products; a preference that appears stronger than it is in other regions.

Alaska and Northwest Territories producers face similar problems to Yukon firms and are in strong competition with kiln-dried products for consumer support, but indicate good consumer acceptance of air-dried products. Pierce (1986) and Sampson et al. (1987), report that consumers in Alaska are prepared to purchase air-dried and green materials if they receive a quality product. Bohning (1986) and Northwest Territories distributors also indicated that there was a great deal of consumer acceptance of green and air dried lumber products, with these products commanding a premium over kiln-dried products from High Level, Alberta.

There are four major consumer groups in Yukon, namely; building contractors, mining companies and other major industrial users, government, and the general public. Estimates of market size data from Bohning (1986), Ondro and Williamson (1982) indicate that building contractors in Yukon represent approximately 67% of the total market in lumber products, government represents 9.2% of the market, mining about 8%, and the general public approximately 12%.

The mining industry absorbed nearly all of the local sawn lumber production in 1986/87. Additional market opportunities have recently developed with the Ketza River gold mine and several prospective mine projects in the Carcross and Faro regions. However, the additional consumption will not likely exceed 500 M fbm. Yukon firms wishing to expand will have to convince private home builders and individual consumers to purchase Yukon-produced sawn lumber products. Sales to government may provide some initial support to operators,

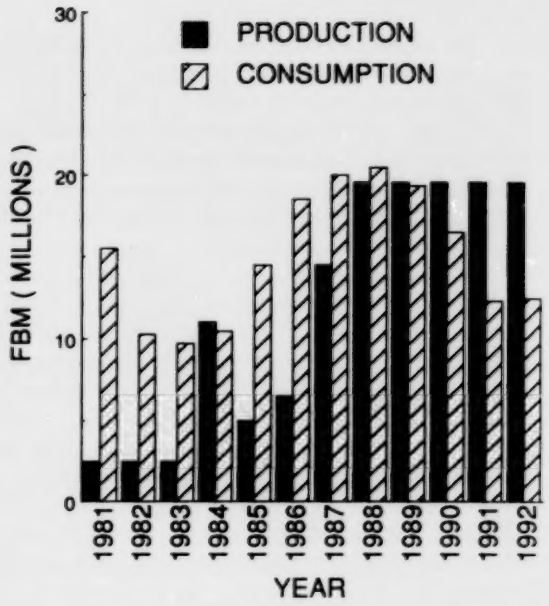

FIGURE 5. Estimates of lumber production and consumption in Yukon, 1981 - 1992.

particularly those living in rural regions, but the long term strength of the industry will be determined on how well firms can sell their product to individual Yukoners[13].

Consumption data by community are not available, but there is evidence that Whitehorse dominates the market. It is likely that the consumption patterns for lumber products are similar to those for most products in Yukon. This suggests that 70-75% of the consumption will occur in the capital, 10-15% in the communities of Watson Lake, Faro/Ross River, and Dawson City and the remainder throughout the territory's remaining communities. Marketing efforts to encourage the purchase of local sawn lumber products are best concentrated in the Whitehorse area, with individual Whitehorse consumers targeted for local consumption and government purchasing agents targeted for sales in rural communities.

Annual consumption is likely to grow for another year or so and then begin to decline as the housing market stabilizes and the regular 3–5 year business cycle results in lower demand (Figure 5). In the long run, forest products demand is likely to grow at approximately 2-3% per yr reflecting the long-term growth trend in the economy, suggesting that demand could approach 13 MM fbm by the mid-nineties. Substantial evidence has been provided supporting the long-term dominance of the lumber products markets by southern producers.

In order to increase production and market share, Yukon firms will have to make major inroads into the

TABLE 9. Estimates of product demand and supply in the Yukon forest industry 1986/87

Product	Market Share (%)	Product Demand (M fbm)	Product demand by Kiln dried	Type Green (M fbm)	Product Supply
Boards	10.0	1491	1193	298	456
2x2	1.4	209	198	10	
2x4	30.3	4518	4292	226	
2x6	18.7	2788	2649	139	1330
2x8	12.9	1923	1827	96	
2x10	8.9	1327	1261	66	
2x12	3.2	477	453	24	
3x	0.9	134	0	134	
4x	6.9	1029	0	1029	1476
6x	3.4	507	0	507	551
HL	3.4	507	0	507	851
Total	100.0	14 910	11 873	3037	4664

Source: Heartwell 1987. Data on market share are based upon material in Peschke 1986, p. 51.

surface-dry lumber market within the territory. Yukon operators have the potential to be cost competitive with outside suppliers of surface-dry lumber products, due in large measure to the transportation cost barrier and low stumpage rates that help to compensate for the higher production costs.

Table 11 compares the costs of two firms to supply kiln-dried lumber to Whitehorse in June, 1987. Data supplied by Deloitte, Haskins and Sells on the Hyland Forest Products mill of Watson Lake were compared to data supplied by Price Waterhouse on a representative firm from the interior of B.C. The results suggest that it would cost Hyland Forest Products $299.39/M fbm to supply lumber to Whitehorse while the interior British Columbia firm would supply the product for almost $20.00 less or $282.46/M fbm[14].

The cost disadvantage should be erased for Hyland Forest Products by the end of 1987 when their mill upgrade is completed. Using wood residue to produce power will reduce costs by $12.53/M fbm, operating costs should be reduced by at least $20.00/M fbm using the new equipment, and new logging contracts should reduce logging costs by $10.00/M fbm.

A further cost advantage to Yukon's forest operators is the recent revision to the British Columbia stumpage system. This revision is expected to increase the stumpage charges from an average of $1.38/m³ to $9.86/m³ or from $6.20/M fbm to $48.33/M fbm. This will increase the overall costs to interior British Columbia sawmills by slightly more than 15%[15].

Countering these cost advantages is the fact that Yukon's major competitors, interior British Columbia firms are among the most cost-efficient in the world in producing large quantities of low-value lumber. This increased competitiveness of British Columbia firms has resulted in a steady downward trend in the price of standard dimensional lumber (see Figure 6) and in 1986, many firms could produce lumber for as little as $77.00/M fbm. Yukon firms that compete with these firms must be able to produce large quantities and be willing to accept a small markup per unit of product. Transportation costs of hauling interior British Columbia products can also be lowered by up to $20.00/M fbm using super B-trains.

The replacement of the market with local rather than imported lumber may prove difficult, at least in the early stages. The Yukon public has become accustomed to receiving high quality kiln-dried lumber from British Columbia, while their experience with Yukon producers has not been as good. There may be consumer resistance to using the local product at the beginning, but if quality control can be maintained, that resistance will undoubtedly decrease over time. The Yukon operators will have to be able to supply quality products on time, and in quantities requested.

Competition, especially non-price competition will be another factor for Yukon operators to consider. British Columbia suppliers are large, highly competitive firms with extensive marketing systems who can offer significant non-price benefits to Yukon distributors. Benefits such as generous credit terms, no-interest financing, and

TABLE 10. Forest product consumption by product type, source of product, and season of consumption, 1985

	Volume (100/fbm)		Type (%)		Source of supply (%)			Season of consumption 1985		
Produce	16'	Other L.	K.D	Green	Yukon	B.C.	Other	Jan-Apr	May-Oct	Nov-Dec
1x4	100	200	84	16	20	80		20	70	10
1x6	122	172	75	25	25	75		18	75	7
1x8	29	87	79	21	25	75		18	75	7
2x2	23	79	100	–	25	75		20	70	10
2x4	616	1535	100	–		100		20	20	10
2x6	177	1154	100	–		100		20	70	10
2x8	200	715	100	–		100		20	70	10
2x10	207	428	100	–		100		20	70	10
2x12	107	118	72	18	10	90		20	70	10
3x8	8			100				10	80	10
3x10	4	20		100				10	80	10
3x12	12	22		100				10	80	10
4x4	38	30		100				10	80	10
4x6	62			100				10	80	10
4x8	6			100				10	80	10
4x12	3			100				10	80	10
6x6	81	22		100				10	80	10
6x8	47			100				10	80	10
8x8	20			100				10	80	10
10x10	3			100				10	80	10
TOTAL	1865	4582								

TABLE 10. cont'd

	Volume (100/fbm)		Type (%)		Source of supply (%)			Season of consumption 1985		
Produce	16'	Other L.	K.D	Green	Yukon	B.C.	Other	Jan-Apr	May-Oct	Nov-Dec
6x8 logs		20	100			100		100		
Siding logs	65	80	100		20	80		10	85	5
Siding(T&C)	106	66	100		20	80		15	80	5
Shakes	40 sq					100			100	
Shingles	180 sq					100			100	
Fence Posts	15 lifts					100			100	
Plywood	900 lifts					100		10	80	10
Chipboard	20 lifts					100		10	80	10
Waferboard	20 lifts					10		80	10	
Lamin. Beams	500 lifts					100		100		
Trusses	2000 rand 1.					100	5	90	5	

Comment: Not included in the above are imports by truckers (utilization of Back Hauls), purchases by general contractors (truckloads), and private purchases by individuals importing for their own use.

SOURCE: Peschk 1986 pg. 56.

TABLE 11. Comparison of costs to supply lumber products in Whitehorse (June, 1987)

	Watson Lake ($CDN/M fbm)	Interior, British Columbia ($CDN/M fbm)
Logging costs	96.39	93.46
Mill production costs	168.00	104.00
Transportation costs	35.00	85.00
TOTAL	299.39	282.46

Sources: Deloitte, Haskins and Sells (1986), Various trucking companies

volume discounts can provide non-price assistance not available from Yukon firms.

A high priority for larger firms like Hyland should be to penetrate and hold the local SPF dimensional lumber market. Hyland will produce the volume of materials required to maintain lower unit costs and will be able to make smaller returns on each unit and still return a reasonable profit.

Data from the Yukon Forest Industry Survey conducted in August, 1987 and outlined in more detail in Heartwell (1987), show that small Yukon firms face much higher production costs than larger mills. Smaller Yukon firms tend to have milling costs for rough lumber of $140.00/M fbm and face extra costs of $35-40/M fbm to plane and dry the lumber. This puts small firms at a competitive disadvantage with Hyland Forest Products and southern firms in the production of standard dimensional products.

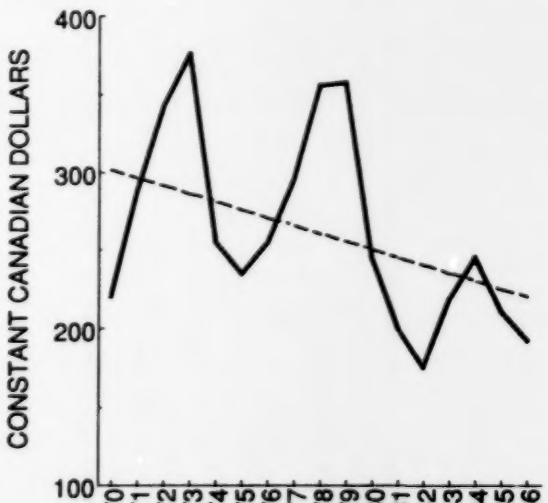

FIGURE 6. S-P-F price history, FOB mill.

The return to smaller operators from the sale of kiln-dried lumber is also very small due to the extremely competitive nature of these suppliers. Large firms make good returns on investment because they sell extremely large quantities. On the other hand, small firms can make a reasonable markup on rough dimensional lumber, sold directly to the customer, and on timber, cants, and specialty products that they can sell at competitive prices.

The strategy for the small Yukon firms should be to produce more specialty products. These firms should look at dimensional lumber products such as siding, flooring, and panelling. As well, they should consider expanding into the present kiln-dried dimensional market by manufacturing a line of rough lumber products that can be used for construction projects such as fencing, decks, saunas, and green houses.

Peschke (1986) indicated that to produce improved quality and a greater variety of products, firms will require newer types of equipment. However, this equipment can be installed for a low cost and is capable of providing a reasonable return on investment.

The impact of small firms moving into the specialty market could be significant. For example, a standard 1200-1300 sq. ft. (112-121 m^2) home will use 7-8 M fbm of dimensional lumber for the basic framing, while the woodsiding will add 5 M fbm. The value of the basic dimensional lumber will be $2400 wholesale, while the value of the siding will be $4000-5000 wholesale.

The size of this market is also reasonably large. There are 80–100 homes built in the Yukon annually almost all of which use imported cedar or vinyl siding. If Yukon firms could obtain half of this 500 M fbm home siding market, it would mean revenues of $120 000-150 000 annually. Fine interior panelling can also be

created from pine, birch and poplar for use in local homes. Again, a single feature wall in a home can use products with a value upwards of $2000 to $2500. Operators can sell rough decking and fencing directly to consumers for $350/M fbm, while they receive only $280/M fbm for dried dimensional lumber from the wholesaler. Small firms should be encouraged to expand efforts to sell their rough product.

CMHC standards require that all construction materials in homes they approve must be surface dried. This drying can be obtained by either kiln drying or air drying. The major problem for Yukon firms is their practice of not stamping their lumber and their lack of the knowledge regarding proper procedures for air drying. Efforts must be made by industry and government to educate operators on the proper procedures and to establish a lumber inspection system[16].

The advantage of the air-dried lumber is less wane and greater structural strength than kiln-dried products. A premium of up to $30/M fbm was paid in the Northwest Territories in order to obtain the superior air-dried product. The key was for firms to properly dry the lumber, have the product inspected and stamped, and to aggressively advertise the advantages of air-dried lumber.

One legitimate problem for operators in Yukon is that air drying takes 30-40 days in most areas. This means that firms must hold large inventories in their yards. Government assistance in the form of inventory financing is available and should be considered by operators.

Operators interviewed in Alaska reported significantly increased consumer support for their products once they began grading.

In order to obtain this reputation for higher quality, the Northwest Territories forest operators instituted a formal lumber inspection system. The Northwest Territories Forest Industry Association, formerly the Northwest Territories Lumber Grading Agency, is accredited under the Canadian Lumber Standards Accreditation Board and provides grade stamps and inspects production from Northwest Territories firms to ensure they meet the Canadian lumber standards.

3.3 Other Products

Several other forest products produced in Yukon may have development potential. House logs, pine cones, and joinery lumber materials are all utilized in Yukon. Furniture is also produced in Yukon and a recent report by HLA Consultants indicate good prospects for these products especially if the Yukon government supports the firms by purchasing their products.

Data from the Forest Resources division of DIAND–Yukon show that roundlog production for natural log home construction appears to be relatively constant at approximately 2500 m^3 per year, sufficient to build 20–25 homes. Most of the logs have been used for local construction while the balance has been exported. The market for natural log homes in Yukon appears to be stable and is likely to remain that way in the future. Factors such as consumer preference for the more standard home, the high labor content in the home construction, tighter CMHC regulations governing these homes, and possible increased insurance costs have tended to keep the market small.

Pine cone production in the Yukon is carried out by seven subcontractors and provides seasonal employment for 15 to 20 people. These operators harvested 2170 hectolitres of cones for export abroad in 1986. No seeds are presently used in the Yukon.

Presently there is no market for pine cone seed within the territory. Neither the Yukon Government nor the Federal Government undertakes silviculture in the Yukon and forest operators are not required to reforest. Hence, there is no demand for seed or seedlings in Yukon forests. However, the Forest Resources division of DIAND–Yukon hopes to commence a program for reforestation and planting in the near future. A sizeable portion of the most fertile and easily accessible timber growing areas in southeastern Yukon have been logged and natural regeneration has not been adequate (28% successful).

Forest resources officials in Yukon have indicated that there is a backlog of 10–12 MM trees and that it would require about 1.5 MM trees per year for 11 years to eliminate the backlog[17]. With the backlog eliminated, it would then require an annual planting of 1 MM seedlings to keep up to normal logging operations. Using the B.C. governments standards for active regeneration and assuming that 2 MM seedlings would be replanted each year, there would be an annual demand for 50 hl of cones[18]. However, since spruce only produces cones every 4-10 years, a bank of 10 years supply, or 500 hl, should be gathered during the next spruce cone season.

As well, seedlings rather than seeds are used by government for reforestation. Given that growing stock in the south has proven to be incompatible with the northern conditions, and that a transportation cost barrier exists, it would seem likely that a tree nursery would be required in the territory. This would bring additional income and employment.

In the interim, a small pilot program, now in progress, will test the viability of seedling production. The test program is studying seedling production, and new seed types in efforts to improve the quality of forests in the north. Genetic variation in Yukon lodgepole pine is known to be valuable and there may be other potentially valuable genetic variants of Yukon white spruce and alpine fir.

Joinery lumber production is small in the Yukon with three small operators. The domestic market is relatively small and it is not likely that the local market

will expand significantly in the future. There are too few homes constructed in the Yukon to justify more than one or two plants for local consumption requirements. However, there is export potential and one firm, Northern Windows, is already producing windows for sale to Western Canada. The prospects for joinery exports is positive. See Section 5 for a more detailed discussion.

Similarly, the truss market is restricted to two firms who supply almost all of the demand for the Yukon housing market. Further expansion in the local market is unlikely due to the small market size. However, some potential appears to exist for exports and this also is discussed in Section 5.

Finally, a glue-laminated beam factory has been considered as a means to expand the use of Yukon forest products. Again, the local market is too small to justify such a facility and hence it would have to count on exports to survive. The possibilities for exporting this product are discussed in Section 5.

4.0 EXPORT MARKETS

In the past two years Yukon operators have sold less than 1.5 MM fbm of lumber, timber, cabin logs and miscellaneous wood products, worth approximately $600 000, to customers located outside the Yukon, largely in Alaska and the Northwest Territories. This is substantially less than the $2.6-3.0 million earned from the 8-10 MM fbm exported in 1980/81.

Although past and present production levels do not match domestic demand, the upgraded Hyland Forest Products mill will require export sales if it is to reach and maintain their new 20-30 MM fbm production capacity. As well, smaller operators planning to expand their operations will need to export a portion of their specialty products in order to remain a profitable position.

Figure 7 illustrates that Yukon is strategically placed to compete in markets located in Alaska, the Mackenzie Delta of the Northwest Territories, and overseas, especially Pacific Rim countries. Yukon has a well established transportation network to these regions, and with high quality and competitive products, can potentially develop these export markets. As well, a number of other markets, such as Europe and Australia, also become available if a competitively-priced product can be delivered. The purpose of this section is to review the market characteristics of these regions and assess the export potential for Yukon products.

In assessing these prospects, however, some caution is in order. Readers must recognize that exporting regions such as ours often serve as residual, or "a last in first out" supplier to world markets. Higher production, transportation, and distribution costs, lower volumes, small domestic markets and intense international competition mean that the export market must be approached with caution and should not be considered the panacea for development of Yukon's forest industry. Yukon has the potential to play an active part in the world market but it should pick these markets and products with care.

Small is also an important concept to stress for Yukon's role is very small on the world stage. Even if Yukon's forest industry was producing 70 MM fbm of sawn lumber annually, this would only be a a small part of Alaska's 317 MM fbm in sawn lumber exports in 1986 and only a tiny fraction of British Columbia's production of 21.8 billion fbm in sawn lumber in 1986.

Small isn't bad, however, and it could be very good if Yukon operators were to develop products, select customers, and develop appropriate market niches. Uniqueness and diversity are important descriptors for international trade in Yukon products.

4.1 Mackenzie Delta in the Northwest Territories

The Mackenzie Delta area has historically been a very strong market for Yukon retailers. The region has several communities including Ft. McPherson, Aklavik, Inuvik, and Tuktoyuktuk with a total market population of about 9000 people in 1986. The largest community in the region is Inuvik with an estimated population of 3224 in 1986. The gross income of the trading area was $151.2 million and building permits worth $5.6 million were issued that year (Mitchell 1986).

Bohning (1986) reported that in 1981, the region imported more than 6 MM fbm of forest products from Yukon (Figure 8), a consumption of 667.67 fbm *per capita*. The largest portion was kiln-dried dimensional lumber for residential building construction, originally obtained from Yukon Forest Products or southern suppliers. A significant amount of rough lumber, timbers, and logs were used by the Beaufort Sea oil industry for a variety of projects, including road construction, drilling platforms, drilling pipe storage racks, and pilings.

However, the economy of the Mackenzie Delta region began to decline in 1984 and recent studies (Peschke 1986; Deloitte Haskins and Sells 1986) report that consumption of Yukon products had dropped to 4.2 MM fbm (477 fbm/capita) in 1984.

By late 1986, the entire regional economy had collapsed in the Mackenzie Delta and the consumption of forest products plummeted to 750 M fbm of which Yukon supplied about 200 M fbm. Oil exploration in the Beaufort Sea was suspended due to the dramatic decline in oil prices and the elimination of attractive exploration incentives. In addition, the Canadian Federal Government closed its armed forces base and removed more than 250 staff from

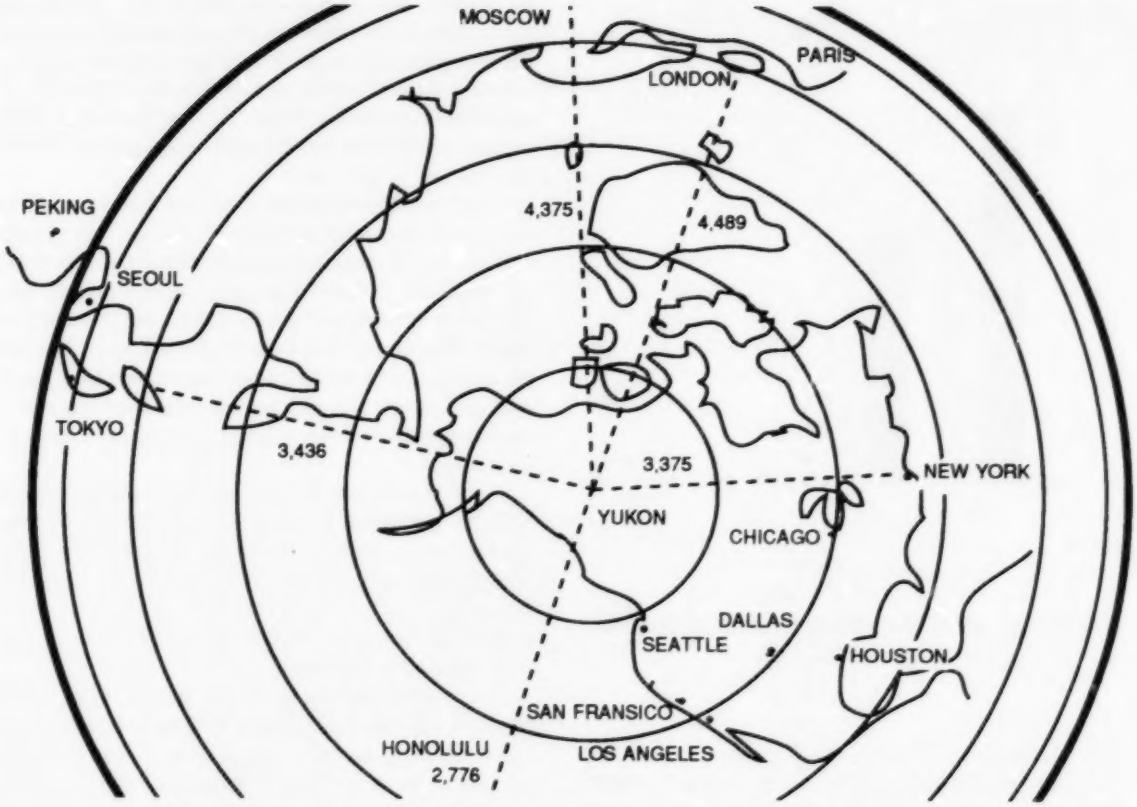

FIGURE 7. Global projection centered on Yukon.

the community.

Prospects for product demand remains poor. There has been only modest exploration activity in the region and housing starts are almost non-existent, as are expenditures for repairs and renovations. Recent indications are that less than 500 000 fbm will be required by residents of Inuvik in 1987, and a significant portion of that will be transported up the Mackenzie River from Hay River, Northwest Territories.

Prospects for strong export sales of Yukon products to the Mackenzie River region are limited in 1987. The economy of the Delta region is likely to remain in a depressed state until next spring when Gulf Resources of Canada is expected to resume drilling in the Beaufort Sea. The rise in the oil prices to $20.50 US has fueled optimism that the Gulf Resources plan, which calls for the drilling of three wells from a single island on the east side of the Amauligak field, can proceed. If these wells confirm the field's potential of 800 million barrels, full-scale development would commence in 1990, with a view of startup in 1994.

As oil exploration gets underway, the demand for forest products should rise to the range of 3-4 MM fbm in 1988 and return to levels of 10-15 MM fbm in the early 1990's. The return of Gulf Resources Canada to the Beaufort Sea also revives the prospects of moving logs from the Kotannelee area of eastern Yukon, down the Liard and Mackenzie Rivers to Inuvik, for use as breakwater and pier material. A 1985 proposal by Prophet River Spruce to barge over 2 MM fbm of logs down the river collapsed with the decline of the oil industry in the region.

At present all future development in the Beaufort Sea region depends upon the price of oil. Oil analysts expect that prices will rise quickly in the 1990's, giving impetus to a prediction of strong export possibilities to the region.

Bohning (1986) noted that Yukon had a natural advantage in the provision of forest products to the Mack-

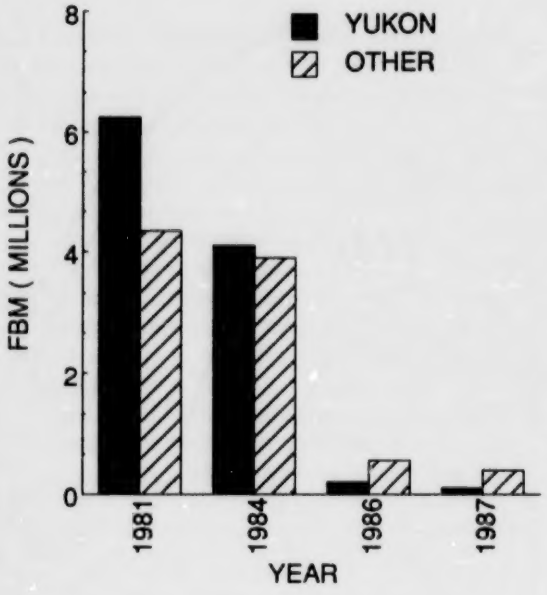

FIGURE 8. Forest product imports to the Mackenzie Delta region, 1981-1987.

enzie Delta due to the Dempster Highway. Forest products from Whitehorse could be transported to Inuvik for $80/M fbm, while products produced in Watson Lake could be moved to the region for $108/M fbm. This compares to a cost of $140/M fbm to move lumber products from northern B.C., and $80-120/M fbm from Alberta via the Mackenzie river. This distinct transportation advantage suggests that the Mackenzie Delta area is one market that should be actively explored by potential operators.

Yukon operators should begin now to develop contacts with officials of Gulf's drilling subsidiary Beaudril, in order to become familiar with product requirements and standards, and to make buyers aware of Yukon products and prices.

4.2 Alaska

Alaska is a vast geographical area adjacent to Yukon containing a diverse economy and a population base of more than 480 000 people. This large market in close proximity to Yukon provides a natural and major potential market for Yukon forest products. In the past, Yukon firms have made some inroads into this market but the potential appears to exist for significant exports to several areas of the state.

The total market in Alaska is essentially broken down into five forest regions, namely: southeast Alaska-the Panhandle, southwest Alaska, southcentral Alaska, the interior, and the north (see Figure 9). Within these forest regions, the interior region appears to be the prime export target. Fairbanks is the major community in the region and is located about 1400 km from Watson Lake and 960 km from Whitehorse. The population base of the region is over 90 000 people and incomes have historically been high.

Interior Alaska has one of the most diversified economies in the state with government, military, oil and gas, and tourism all making strong contributions to economic activity. The economy has grown rapidly over the past twenty years while the local forest industry has remained small. Timber supplies from the United States National Forests have been limited, thus constraining local operators, and the extra transportation costs from the port of Anchorage to Fairbanks provides a strong tariff to southern imports.

Associated with the interior Alaska market are the oilfields of Prudhoe Bay that are accessible via a private road running north from Fairbanks. This northern region is almost exclusively devoted to the production and distribution of crude oil and has virtually no domestic forest production. Prospects appear good to supply this region from Yukon via Fairbanks.

The other regions in Alaska provide only limited potential for Yukon due to the existence of an established forest industry, access to much cheaper forest product imports, and a transportation barrier for Yukon suppliers.

Table 12 provides a summary of the total consumption of lumber products in Alaska over the period 1977-1985. Consumption has been cyclical in response to market trends, ranging from lows of 77 M fbm in the late 70's to 170 MM fbm in the early 80's. Consumption in the interior region is estimated to range from a low of 15.4 MM fbm to a high of 29.8 MM fbm. The Prudhoe Bay demand for lumber was virtually zero in 1986; but has been as high as 7 MM fbm during boom periods. In summary, lumber market demand ranged from 12 MM fbm in recessions to a high of 37 MM fbm during boom periods.

Early indications are that the Alaska economy should begin to stabilize in 1988 and begin a moderate growth starting in 1989. Activity in the interior is expected to lead the recovery as forestry, fishing, and tourism have shown strong increases in the past year, and the oil industry is expected to recover soon with the rise of oil prices.

Recent estimates of future demand for lumber, fuelwood, and houselogs in the interior have been provided by the Alaska Division of Forestry. Table 13 provides a low, moderate, and high estimate of the demand over the period 1985-2000[19]. Using the conservative estimate, demand will range from 22.4 MM fbm in 1990 to 27.9 MM fbm in the year 2000. The US Forest Service restricts the timber harvest in the interior's Tanana Valley region to around 7

TABLE 12. Estimated Alaska forest products consumption, 1977-1985

Production source	Year 1977	1978	1979	1980	1981	1982	1983	1984	1985
Waterborne imports (M fbm)									
Timber products*	0.55	0.44	0.65	0.26	0.46	0.68	5.61		
Lumber products**	112.83	88.92	61.34	59.14	105.38	145.07	136.68	135.00	85.00
Overland imports (M fbm)	1.00	0.80	0.80	3.24	4.09	5.08	12.45	8.46	6.41
Local production***(M fbm)	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
TOTAL (M fbm)	129.38	105.16	77.79	77.64	124.93	165.83	169.74	158.46	106.41
Canadian imports (M fbm)			8.77	14.98	10.73	21.03	35.50	39.54	26.48
CDN market share (%)			11.3	19.3	8.69	12.7	20.9	25.0	26.1
Alaska population (000)	403	405	403	402	416	444	481	487	485
Per capita consumption	321	260	193	193	300	373	353	325	329

Source: Knapp and Foster 1986.

*Corps of Engineers "Waterborne Commerce of the United States" – Part 4 (Pacific Coast and Alaska)

**US Bureau of the Census, Census of Foreign Trade. Overland imports calculated as the difference between total imports and imports by vessel.

***Local production figures were not available but they were estimated from conversations with Alaska officials in the Department of Development and Commerce.

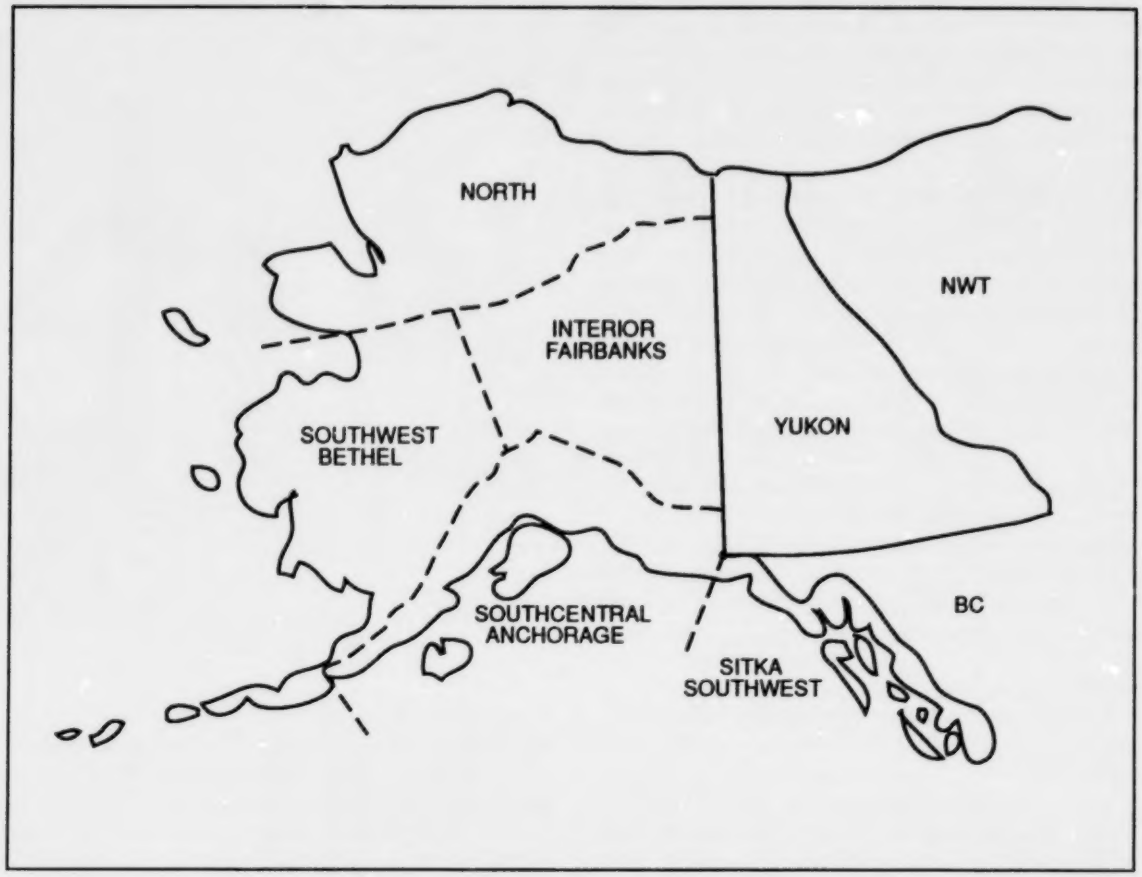

FIGURE 9. Alaska's forest regions.

MM fbm, leaving an available market of 15-21 MM fbm for the region (Appendix II).

Using a highly conservative figure of 5 MM fbm for the Prudhoe Bay area, this means a total potential market for Alaska of at least 26 MM fbm annually. This market alone could absorb any surplus production from Yukon.

Fuelwood consumption is expected to range from 16.7 M ft^3 (18 500 cords) to as high as 72 M ft^3 (80 200 cords) by the end of the century. With allowable cuts of fuelwood in the region at 20 M cords, it appears that the interior's demand for fuelwood could significantly outstrip supplies by the end of the century. Demand is being adequately accommodated presently due to the abundance of competitively-priced petroleum products.

The interior region appears to provide an excellent export opportunity for Yukon firms. The poor Alaskan economy has substantially reduced the demand for imported lumber products in the interior region in 1987, however, one Fairbanks distributor expressed a willingness to purchase Yukon products if high-quality, competitively priced materials could be supplied[20].

Yukon has several advantages over American, Alaskan, and British Columbia competitors. The advantages lie in low stumpage charges, competitive transportation costs, good exchange rates, and short delivery times. These factors help to overcome the lower costs of production that can be achieved by efficient British Columbia and Pacific Northwest producers.

Table 14 provides an estimate of the comparative costs for Yukon, interior B.C. and interior Alaska to supply lumber products in Fairbanks. The table shows that Alaskan operators can produce green lumber for $293 Cdn/M fbm, while Canadian operators can deliver kiln dried lumber for around $359 Cdn/M fbm. Green lumber in Alaska can be produced for $35-40 Cdn/M fbm less or about $325 Cdn/M fbm.

Yukon operators appear to be able to compete favorably with British Columbia suppliers in the production of kiln dried material, provided production costs are no more than $145 Cdn/M fbm. Moreover, data from the

TABLE 13. Forecast demand for wood products in interior Alaska.

Wood Products		1985	1990	1995	2000
Lumber/houselogs (MMbf)	Low*	18.1	22.4	25.4	27.9
	Mod.**	30.1	34.0	38.0	42.1
	High***	30.1	37.2	41.2	45.3
Fuelwood (MCF)	Low*	16.7	18.3	20.3	22.2
	Mod.**	45.5	50.6	57.2	63.4
	High***	54.4	59.5	66.1	72.3

Source: Alaska Division of Forestry, and Todd 1982.

TABLE 14. Comparison of costs to supply lumber products to the interior of Alaska (Fairbanks), from local B.C. and Yukon suppliers

Cost Components	Interior Alaska ($Cdn)	Interior British Columbia	Yukon
Logging costs	115.00	87.63	95.19
Stumpage	40.26	5.83	1.20
Mill production costs	183.40	104.00	145.00
Transportation costs	0.00	145.05	94.22
Export Tax	0.00	16.20	21.75
Total	293.00	358.71	357.36

Sources: Pierce 1986, Deloitte, Haskins and Sells 1986, B.C. Ministry of Forests and Lands, Valuation Branch

Alaska Division of Forestry suggest that the wholesale price of lumber in Fairbanks was $376 Cdn in 1986, confirming that Yukon has the potential to provide competitive products.

The prospects for future market penetration appear good for Yukon. The Alaska Pacific Bank predicts a modest recovery for the Interior Alaskan economy in 1988 which should increase demand. With a market penetration of 25% by 1990, sales could reach 5.6 MM fbm.

Hyland Forests Products, with its kiln dried product will likely be the major export beneficiary as they should be able to competitively supply standard lumber products into Fairbanks. As well, sawmills located near the Yukon/Alaska border should have a competitive advantage created by the exchange rates in the sale of lumber to the region markets in Tok, Delta Junction, and Eagle, Alaska. Without a dry kiln, other Yukon operators will not be able to compete in the interior market as Alaska producers have a substantial price advantage in their local markets for green lumber. There has been a long-term trend of declining lumber prices in the region that will require Yukon firms to actively work to reduce production costs. Transportation costs have been declining in recent years due to increased competition and larger barges. Yukon firms will have to move to larger equipment such as super B trains in order to remain competitive.

The export tax has had a detrimental effect on British Columbia exports to Alaska and changes to the stumpage system in British Columbia should increase this problem for the British Columbia interior. Yukon is not required to revise its stumpage system and will have an advantage once the export tax is removed across the country[20]. Finally, changes in exchange rate structures are likely to impact the prices in Yukon's lumber. Every one cent change in the Canadian dollar will have a $3.00 Cdn/M fbm impact on the costs of Canadian lumber.

TABLE 15. Estimated costs to supply Yukon fuelwood to selected cities in the United States ($Cdn/cord)

Cost Components	Fairbanks	Juneau	Seattle
Wood costs	30.00	30.00	30.00
Packaging	9.87	9.87	9.87
Transportation	121.20	62.42	101.30
Customs fees, etc.	10.00	10.00	10.00
TOTAL	171.07	111.29	141.30

Source: Loeks 1985, and estimates from Yukon trucking companies

A final important consideration is product quality. During research for this report, seven distributors in Fairbanks were interviewed. These firms expressed strong support for their existing major SPF supplier, D. Groot Logging of Smithers, British Columbia. They indicated that this company consistently provided lumber that exceeded the national grade standards, and that they had found the product to be superior in quality to other suppliers from the interior of British Columbia. The Fairbanks retailers supported Yukon lumber imports but felt that Yukon lumber would have to match this superior quality at competitive prices in order to supplant the British Columbia firm.

Houselogs and fuelwood exports are two other products that have some potential. The value of houselogs in Alaska has been increasing in recent years as local supplies decline. Yukon firms have been able to make some inroads into this market in the early 1980's. The size of the market is not large, ranging from 250 000 fbm to 400 000 fbm, however, it is a specialty market that is willing to pay a premium for quality. Yukon firms have the advantage of lower stumpage costs which offset the transportation disadvantage and this allows them to compete with Alaskan firms. Houselog exports are particularly useful for smaller operators as it requires less processing than dimensional lumber.

Fuelwood is another area where Yukon firms appear to have a competitive advantage. Table 15 outlines comparative estimates of the costs to supply Yukon fuelwood to three Alaska communities. The costs range from $111 Cdn to supply Juneau markets to $179 Cdn to supply Fairbanks. Export potential looks good for Juneau and Seattle. Fuelwood prices range from $146 Cdn per cord in Juneau to $166–200 per cord in Seattle. This gives a potential profit margin of $35 Cdn to supply Juneau and $25-30 Cdn to supply Seattle. Costs can possibly be further reduced by obtaining contracts with transportation companies to backhaul fuelwood to Haines, Alaska for transshipment south.

The Fairbanks market, however, appears to be a poor region for exports as the market supply of 20 000 cords appears to be meeting the present demand. As well, the prices for fuelwood are $145 Cdn/cord, a sum significantly less than it would cost Yukon firms to supply the product.

4.3 Pacific Rim Nations

As Figure 7 outlines, Yukon is well positioned geographically to service markets in the Pacific Rim. Japan, South Korea, Taiwan, and China, are the major nations of the region and have a population of over 1 billion. With high population densities, inadequate supplies of domestic forest resources, and dynamic economies, these nations are major consumers of forest products. In fact, this region imports over 25% of the world's forest products.

With the exception of China, these major Pacific Rim nations have a well established world trade in forest products. Each market has its own trends and particular characteristics governing imports and product demands.

Overall, it would appear that the Korean market is the most promising for Yukon, followed by China. These two countries are developing nations, with rapidly escalating demands for products, insufficient domestic supplies, and less stringent import criteria. Japan is the largest and potentially most lucrative market, but the market place is highly competitive, demand is declining, and their consumers are very discriminating. Taiwan is a sophisticated and highly competitive market , with a small and declining demand for SPF products, thus making market penetration here extremely difficult.

Three items should be noted, however, before going into a more thorough review of the markets in each nation. First, the Pacific Rim nations have large domestic production facilities presently in place and often impose stiff tariffs to protect their industries from competition. Inroads into these markets for more fully processed lumber products is difficult.

Major exporting nations to the Pacific Rim sell both logs and finished lumber products, and the trend in Canada is also towards more log exports. Log exports have gone from 6% to 17% of total sales in British Columbia during the 1939-1984 period (Haley 1985). Exporters use a form of joint marketing of logs and lumber as an effective means of penetrating these foreign markets.

If Yukon chooses to continue its policy of restricting or eliminating exports of logs to these nations, it will face severe hurdles in selling its finished lumber products.

Second, Yukon's logs and lumber are largely good quality construction grades rather than the higher quality grades available from the coastal mills in North America.

This suggests that Yukon products will compete directly with similar quality products from a host of countries. Yukon must not only compete with SPF produced in the interior of British Columbia, but with larch from the Soviet Union, radiata pine from Chile and New Zealand, and hemlock and fir from coastal British Columbia.

Third, Pacific Rim nations tend to have complicated distribution systems, protective tariff barriers, and a broad range of rules and regulations which make marketing difficult. Yukon will have to work to develop access to distribution channels for their products.

4.3.1. South Korean trade prospects

South Korea, a country of 43 million people and an annual economic growth rate of over 10% for the past decade, is seen as a promising market for Yukon's forest products. Korea's domestic softwood supply is very limited due to extensive deforestation during the second world war and the country relies heavily on the import of forest products to support its large domestic forest products industry.

The Koreans imported about 2.2 MM m^3 of softwood products in 1985 with 85% of their imports in the form of logs and 15% in the form of semi-processed and processed products. Softwood imports have been almost exclusively hemlock and Douglas-fir for use as feedstock in their plywood and pulp and paper operations, as basic construction materials in furniture, musical instrument manufacturing, and for finishing work on homes.

Korean demand for dimensional lumber products is rather small. Although the country has averaged over 300 000 housing starts per year for the past decade, concrete is a major building material for homes and the average house uses only 7.1 m^3 of wood.

Demand for good quality construction logs is expected to grow strongly in Korea, especially for use as input into pulp and paper operations. Tropical hardwood supplies have been declining due to restrictive export policies in southeast Asian countries and softwood exports are now beginning to replace hardwoods. Flora and Vlosky (1986) indicated that demand for construction grade logs would rise from 306 MM fbm in 1983 to over 434 MM fbm by 1995. A special type of lower quality log called the "Korea-K" sort, where logs average ≤ 9 in. in diameter, will be the major import product and this is a product which Yukon has in abundance. However, the K-sort is in abundant supply worldwide and is subject to volatile price fluctuation on the world markets.

Demand for timbers, tongue and groove boards, and finishing materials is growing rapidly in Korea. Mine timbers are in strong demand as present mining activities outstrip local supply. High quality woodstock for musical instruments and furniture is always in demand. Major increases in disposable income by residents in recent years has fuelled a rapid increase in demand by Koreans for more unique wood based interiors to complement the basic concrete construction of homes. This has increased demand for higher value added interior finishing products such as window frame stock, panelling, flooring, staircases and doors.

The market factors in Korea appear to support exports of either primary products such as logs, timbers, or cants, or high value products such as panelling, flooring, or joinery products. These products are often produced by small Yukon firms, and they provide the best opportunity for these small local firms to increase sales.

The Korean market has had high protective tariffs for lumber products, ranging between 10 and 20%, however, beginning in 1988 the tariffs will drop to between 2.5-7.5%, making entry substantially easier. The distribution system for lumber is dominated by 12 firms who handle the majority of products imported. However, Alaskan firms have been successful in by-passing the larger importers and developing direct sales agreements with sawmill firms and distributors.

Yukon firms' prospects will be enhanced if they develop close personal relationships with their Korean customers, through cooperative and mutual trade missions. Several analyses indicate that Koreans often complain that North American firms do not conform their products to Korean tastes, necessities, and specifications nor do they take an interest in developing closer business ties. If Yukon firms could develop unique products that reflect Korean tastes and preferences, market possibilities for export would be enhanced and product loyalty would develop.

4.3.2 Japan trade prospects

As Figure 10 demonstrates, Japan is the largest consumer of wood in the Pacific Rim, importing about 65% of its wood fibre requirements. In 1985, Japan imported 63.0 MM m^3 of forest products, with logs accounting for 52% of that total, lumber 8.3%, pulp chips 19.9% and other products 6.3% (Table 16). During that year Canadian exports to Japan amounted to 1.37 MM m^3 of logs and 2.345 MM m^3 of lumber, with spruce-pine-fir (SPF) lumber exports to that country amounting to 338 528 m^3 or 12.5% of the total lumber exports.

There will continue to be a strong demand by the Japanese for construction grade logs as input into the pulp and paper industry and for use by the domestic sawmilling industry. Flora and Vlosky (1986) indicated that the demand for good quality construction grade logs, such as those grown in the Yukon, will expand rapidly over the next decade in Japan. However, Yukon will have to compete in this market with new supplies of radiata pine from Chile and New Zealand, interior British Columbia firms selling SPF, and competition from the Soviet Un-

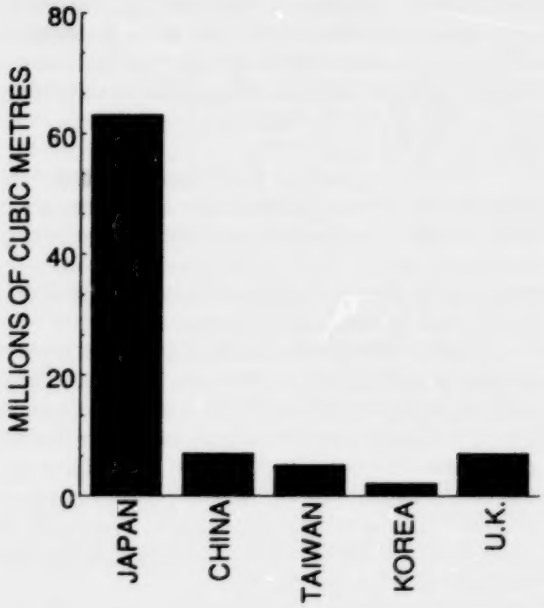

FIGURE 10. Forest products imports by selected countries, 1986

ion's larch exports.

The demand for imported sawn lumber in Japan has declined over the past ten years, an "ominous trend", according to many industry analysts (Widman 1987). Reduced demands reflect slower population growth, declining wood house construction, rapidly rising housing costs and less wood inputs per new home (Flora and Vlosky 1985).

Housing construction is the single most important factor affecting demand for sawn lumber. Japanese housing starts averaged 729 600 units per year for the past decade and there is expected to be from 600 000 to 650 000 homes constructed annually in the country over the next five years. As well, proposed Japanese policies designed to increase investment spending through tax incentives and labor reforms are expected to have a strong stimulative effect on housing demand.

However, Japanese housing starts, expressed in square metres of floor space, have generally decreased over the period 1978 to 1986 (see Table 17). Moreover, the percentage of wood houses to total homes declined dramatically over the period, as did the proportion of wood in homes. Lumber for remodelling and alterations also represents a large market segment, but two independent consultant studies in recent years suggest that activity in this area has declined significantly in the past 10-15 years (Data Resources Inc. 1981, Japan Lumber Journal 1982).

In short, overall lumber consumption in Japan has declined from 0.465 m^3 per household in the mid-60's to 0.110 m^3 per household in 1985 and further declines are expected.

Yukon firms would face increasing competition in a tightening housing market and would likely find it difficult to penetrate the market place.

Demand for higher grade lumber products such as old-growth coastal Sitka spruce, Douglas-fir and hemlock is expected to remain high for use in musical instruments, furniture, and interior exposed surfaces. High quality Yukon SPF could also compete in this market.

Kaufman (1986) reported that specialty products for interior finishes were in high demand. For example, Kaufman reported that five inch square posts were selling for $20 000 per M fbm in 1986 and demand was strong for wooden flooring and other high quality interior finishes. Yukon's spruce is a good quality slow-growing product that has the fine grain and small knots that are ideal for interior finishes. Yukon firms can capitalize on this demand by supplying these special products to specific Japanese suppliers.

Major Japanese demand will still remain with squared metric products called Japanese baby squares. Woodbridge Reed and Associates Ltd. (1984) indicates that interior British Columbia sawmills have locked themselves into producing large quantities of standard kiln-dried dimensional lumber at low cost but are not flexible enough to respond to the variety of needs of importing nations such as the Pacific Rim. The cost minimization product strategy constrains British Columbia from making significant gains in the Japanese market and opens some opportunities for Yukon firms.

If Yukon firms can begin to develop a strategy of processing for value and respond to the individual needs of their potential clients, the opportunity does exist to penetrate the market. This means developing a sophisticated marketing strategy which is geared to meeting the specific demands of the client for the types of baby squares, beams and other products required.

Yukon firms will face several other constraints besides the type of product they have to sell. One major disadvantage is the type of sawn lumber distribution system used in Japan. Japanese firms rely heavily on large trading houses who deal only in large scale orders in lots of millions of board feet and are reluctant to handle smaller orders such as that which would be forthcoming from regions such as Yukon.

Another disadvantage is Japanese concern with quality. Japanese consumers insist that lumber products be cut to extremely exacting standards and place a premium on grain, quality, and structural attributes. Yukon's mills are presently not geared to produce the type of high quality product that is demanded by the Japanese con-

sumer. To supply the market, new equipment would have to be installed and exacting quality controls put in place.

Also the Japanese sawmilling industry is a large and powerful industry in the country. Yukon would have to develop a process for selling products which allowed the Japanese to protect their existing industry. Alaska has met this problem by allowing the export of cants to Pacific Rim nations and Yukon may have to do the same.

Finally, the Yukon has the disadvantage of competing against large sophisticated sales organizations in the Japanese market. The Japanese market place dominates the Pacific Rim and for this reason, the large competing nations place a great deal of marketing emphasis on Japan. Yukon firms do not have the funds to market successfully in the Yukon itself and would be extremely hard pressed to assemble the marketing expertise to compete in the Japanese market.

While specific opportunities do exist to market certain types of high value products such as beams and joinery materials, the prospects for the Yukon to penetrate the Japanese market do not appear good. The Yukon must compete directly with long established and highly competitive nations in a market place with a long term trend to declining demand for basic construction materials and controlled by trading companies which place emphasis on high volume sales.

4.3.3 People's Republic of China trade prospects

The other Pacific Rim nations are presently less significant in the forest products trade than Japan (Figure 10), but China, in particular, is expected to become a major future export region. China, with a population 10 times that of Japan, presently consumes less forest products. Total consumption is roughly 63.0 MM m^3, with domestic production accounting for 56.0 MM m^3, and imports of approximately 7.0 MM m^3.

The United States is China's largest supplier, providing well over 50% of the total supply. Prior to 1983, Canada had not exported to China, but total Canadian exports to the end of 1984 amounted to 1.67 MM m^3 (295 MM fbm).

Future demand for forest products is expected to grow rapidly. China has a population base of one billion people and an annual economic growth rate of 9%. The lack of adequate housing is considered the country's most serious constraint to development and a major housing program has been initiated.

The new home construction program will require builders to import substantial amounts of roundwood and sawn lumber. In addition, the domestic forest resources of the country have been seriously depleted adding strength to predictions of substantial increases in demand for imported materials. If current trends prevail, analysts predict (Chow 1985) that China will demand 80% more forest products than Japan by the year 2000, or over 175 MM m3.

Recently, C. Widman, an analyst with extensive experience in China, indicated that Canada had the potential to immediately supply 2.83 MM m^3 (500 MM fbm) of lumber products to China. China, he indicated, would be equivalent to or in excess of the United Kingdom market and perhaps about half of the Japanese market (Widman 1986).

Log imports, rather than finished lumber products, dominate the forest products trade with China. The Chinese, like most Pacific Rim nations, have a strong commitment to internal processing of forest products and with significant unemployment and underemployment in China, further processing of wood products is given a high government priority. As well, logs give Chinese operators residue for use as feedstock in other operations such as pulp and paper mills, panel board mills, and steam plants.

The demand for logs should grow strongly and will be met by exports from the major forest exporters namely: the Pacific Northwest, Alaska, Chile, New Zealand, Russia, and to a lesser extent British Columbia. Yukon, too, has the potential to sell logs into this market place.

Undoubtedly, the Chinese will demand some quantities of finished lumber products in order to meet the demand for housing in the country and Yukon firms can also work to develop markets for these products. The Chinese have not established a single set of building standards or specifications for lumber use in homes. The orders are generated from the provinces to meet specific end uses, thus providing a great variation in the buy orders. Yukon firms have the opportunity here to work directly with consumers to develop and sell products to meet specific market requirements.

Yukon's advantage is enhanced by the fact that the large dimensional lumber plants in the world, which supply the majority of the construction materials, are not designed to be flexible enough to meet the specific needs of the Chinese. This gives smaller firms such as those in Yukon, the chance to find and exploit market niches in China that are not available to competitors.

As well, the Chinese government has given greater freedom in recent years to regional and local governments to order materials. This means that the Chinese are using a vast array of intermediaries and brokers to process their requests for forest products.

The success of Yukon firms in this market, will depend in large measure upon their approach and market development skills. The Chinese are astute traders, patient negotiators, and very price conscious. Contracts often take two to three years to negotiate and Yukoners must, therefore, begin to develop contacts immediately if they wish to consider impacting on the market in the next few years.

TABLE 16. Industrial timber demand and supply ('000[3]) in Japan, 1977-1987.

	Demand									
							Domestic Timber			
	Lumber	Plywood	Pulp chips	Other	Total[2]	Logs	Forest land wood residues	Mill wood residues	Sub-total	Logs
			[7251][3]					[7251]		
1977	56 564	12 717	29 597	2732	101 854	33 793	438		34 231	44 561
			[7282]					[7282]		
1978	57 560	13 585	29 597	2675	103 417	32 145	413		32 558	46 158
			[7721]					[7721]		
1979	60 314	13 915	32 137	3420	109 786	33 270	514		33 784	46 950
			[7275]					[7275]		
1980	56 713	12 840	35 868	3543	108 964	34 051	506		34 557	42 395
			[6449]					[6449]		
1981	48 718	11 086	29 056	2969	91 829	31 370	262		31 632	35 932
			[6735]					[6735]		
1982	47 862	10 499	28 279	3517	90 157	31 904	250		32 154	33 026
			[6736]					[6736]		
1983	45 990	10 849	30 584	3738	91 161	31 990	326		32 316	32 587
			[6566]					[6566]		
1984	44 518	10 664	32 433	3746	91 361	32 511	363		32 864	31 505
			[6567]					[6567]		
1985	44 539	11 140	33 778	5090	92 901	31 670	130		31 800	31 860
	(100.0)	(105.2)	(101.5)	(112.9)	(101.7)[4]	(101.3)	(35.8)	(100.0)	(100.6)	(99.6)
			[6630]					[6630]		
1986 Esti-mate	44 747 (100)	11 140 (99)	33 778 (103)	5090 (120)	94 755 (102)	31 670 (96)	130 (100)	(101)	31 800 (96)	31 860 (101)
			[6800]					[6800]		
1987 Project-tion	46 060 (103)	11 540 (104)	34 200 (101)	5600 (110)	31 150 (103)	31 040 (98)	110 (98)	31 150 (95)	33 210 (103)	5360 (104)

Source: 1977-1985, Forest Agency
1986 (estimate) and 1987 (projection) are prepared by Conference for Timber Supply and Demand held by Forestry Agency.

Notes: [1] Each category except logs in imported timber converted into log volume (000 m³).
[2] Timber for fuel wood excluded.
[3] Figures in brackets show demand for chips from mill residues, that is included in log volume for lumber and plywood.
[4] Figures in parenthesis show comparison (%) with previous year.

TABLE 16. Continued

	Supply							
	Imported Timber[1]							
	Lumber	Veneer plywood	Chips	Pulp	Other	Sub-total	Total	Import share (%)
1977	4125	118	13 820	4002	997	67 623	101 854	66.4
1978	4467	138	13 116	5954	1026	70 859	103 417	68.5
1979	5656	172	15 003	6413	11 808	76 002	109 786	69.2
1980	6136	199	15 936	7670	2071	74 407	106 964	68.3
1981	4162	122	12 508	5857	1616	80 197	91 829	65.6
1982	5167	181	11 325	6027	2277	58 003	90 157	64.3
1983	4616	210	11 402	7465	2565	58 845	91 161	64.6
1984	4363	347	12 156	7483	2623	58 487	91 361	64.0
1985	4867	960	12 283	8945	4030	62965	94 755	96.4
	(114.5)	(176.7)	(97.2)	(105.3)	(119.1)	(102.3)	(101.7)	
1986 Est-mate	4867 (97)	960 (157)	12 293 (104)	8945 (113)	4030 (129)	62 955 (105)	94 755 (102)	66.4
1987 Project-tion	1180 (110)	12 600 (123)	9300 (102)	4600 (104)	86 250 (114)	97 400 (105)	97 400 (103)	68.0

TABLE 17. Housing trends in Japan

Year	Wooden				Non-wooden			Total		
	Units	Wood ratio	Area	Floor space per unit	Units	Area	Floor space per unit	Units	Area	Floor space per unit
		%	1000 m²	m²		1000 m²	m²		1000 m²	m²
1976	992 966	65.2	84 917	85.5	530 878	40 363	76.0	1 523 844	125 281	82.2
1977	946 489	62.8	83 559	88.3	561 771	43 259	77.0	1 508 260	126 818	84.1
1978	958 158	61.8	89 566	93.5	591 204	46 683	79.0	1 549 362	136 249	87.9
1979	909 534	60.9	88 621	97.4	583 489	47 894	82.1	1 493 023	136 515	91.4
1980	750 653	59.2	75 310	100.3	517 937	43 792	84.6	1 268 626	119 102	93.9
1981	653 647	56.8	66 145	101.2	498 052	41 706	83.7	1 151 699	107 853	93.6
1982	666 960	58.2	67 859	101.7	479 189	39 779	83.0	1 146 149	107 638	93.9
1983	590 848	52.0	58 133	98.4	545 949	41 309	75.7	1 136 797	99 442	87.5
1984	594 144	50.0	57 892	97.4	593 139	42 337	71.4	1 187 282	100 228	84.4
1985	591 911	47.9	57 988	98.0	644 161	45 144	70.1	1 236 072	103 132	83.4
1986	633 858	46.4	61 184	96.5	730 751	49 820	68.2	1 364 609	111 004	81.3
1987										
1	40 116	42.9	3 579	89.2	53 438	3528	66.0	93 554	7 107	76.0
2	49 005	44.9	4 803	98.0	60 249	4161	69.1	109 254	8 967	82.1
3	57 349	47.9	5 912	103.1	62 413	4336	69.5	119 762	10 248	85.6
4	66 425	48.1	6 946	104.6	71 783	5008	69.8	138 208	11 954	86.5
5	59 935	45.9	5 987	99.9	70 558	4820	68.3	130 493	10 807	82.8
6	67 987	45.1	6 761	99.5	82 717	5510	66.6	150 704	12 271	81.4
1987 (1–6)	340 817	45.9	33 988	99.7	401 158	27 363	68.2	741 975	61 354	82.7
1987 (2–12)	298 857	47.8	30 022	100.4	326 650	23 442	71.8	625 507	53 463	85.5

Source: Ministry of Construction, Japan

Moreover, China will demand a certain volume of log exports as part of any program and for Yukon to become a participant in the export market place, it should gear its marketing toward tied sales contracts that sell a mix of logs and lumber.

4.3.4 Taiwan trade prospects

Wood products in Taiwan, like that in the other major Pacific Rim nations, are of great importance. While Taiwan has substantial forest resources, it relies primarily on roundwood imports for both domestic needs and its forest export industry. Total demand for forest products in 1985 was 5.02 MM m^3, with 85% of that total being imported. In turn, almost 70% of this total forest requirement is processed for re-export, almost exclusively in the form of plywood. Taiwanese demand is therefore, significantly influenced by their export markets and the world economy.

Taiwan's imports are almost exclusively logs and cants, with less than 10% of the imports being in finished products. Moreover, the majority of demand is for hardwoods imported from South Sea nations such as Malaysia, Indonesia, and the Phillipines. The demand for softwood products has been limited to pulpwood and some large diameter Sitka spruce for use in furniture and pianos.

Imports of forest products has declined steadily in the 80's from a high of 7.8 MM m^3 in 1978 and projections for the future indicate a trend to further declines.

Prospects for Yukon exports of roundwood or sawn lumber to this market are very limited at present due to the domination of hardwoods in the Taiwanese market place. Some potential exists for pulp chips as discussed later.

4.4 United Kingdom Trade Prospects

The United Kingdom has a small forest base, with only 9% of the country containing productive forest land. France, on the other hand has productive forests on 27% of its land area, while West Germany has 30%. This limited forest base means that only 10% of the United Kingdom's sawn lumber requirements are met from their domestic resource.

The United Kingdom imported almost 7 MM m^3 of sawn lumber and more than 1.4 MM m^3 of plywood and fibreboard in 1986. Canadian shipments to the United Kingdom were 3.22 MM m^3 (568 MM fbm), up strongly from the 2.02 MM m^3 (368 MM fbm) shipped in 1985 but slightly below the record 1984 exports of 3.24 MM m^3 (572 MM fbm).

Strong promotional efforts coupled with a favorable exchange rate have led to increases in Canada's market share relative to its competitors in Scandinavia, Portugal, and the USSR. Market shares are roughly 30% Sweden, 25% Canada, 16% Finland, 10% USSR, 10% Portugal, and 9% other countries.

In addition to the lack of domestic resources, the United Kingdom imports its forest products in the form of processed materials rather than logs. Virtually no roundwood was imported into the United Kingdom in 1986. This provides improved opportunities for selling processed materials rather than the raw material.

Lumber consumption in the U.K. is much higher than it is in the Pacific Rim, averaging about 25 m^3 *per capita*. Moreover, housing starts are strong and this trend is expected to continue. During the 80's housing starts have averaged 195 000 per year and are expected to remain in the 200 000-225 000 range for the next decade as demand continues to exceed available supply. Renovation requirements are also high with 18% of the 3.8 million dwellings requiring renovations.

The housing regulations in the United Kingdom also make market penetration easier. The lumber standards and product dimensions are very similar to those in North America and Canadian operators can easily supply the market using the same standard dimensional products produced for the local market.

However, demand for imported wood in the medium term is expected to level out at around 7 MM m^3 annually. The strong demand for housing will be met, in part, by domestic production from previous reforestation projects and in part by a greater use of concrete and other non-wood materials.

The United Kingdom provides immediate market opportunities because it has the third largest market for construction grade timber in Europe and has consumer characteristics similar to those in Canada. Excellent opportunities exist for Yukon firms to penetrate the market place for standard dimensional products, joinery materials, and specialty products. One company reports that it has obtained a substantial contract in the U.K. and further contracts are expected in the near future.

Nonetheless, competition is expected to remain very strong as the southern US states, and South American countries, such as Brazil, are entering the market place to compete with the established suppliers from North America, Scandinavia, and the East Block nations. Yukon firms will have to be very careful to remain cost competitive and establish strong customer loyalty.

4.5 Other Countries Trade Prospects

Continental Europe, the Middle East, North Africa, India, and Australia have each been suggested as possible market areas for Yukon products. These markets all seem to provide limited prospects for Yukon in the near term but care should be taken to monitor them on an ongoing basis.

Continental Europe is expected to be difficult for Yukon firms to access. Most countries in the region are more self sufficient in softwood products than the U.K. They also face prospects of declining future demand for

softwood due to reduced economic growth and lower housing demand. Canada's traditional export markets to this region have been restricted to high grade clears, Douglas-fir timbers, joinery materials, and industrial products rather than construction grade SPF.

Moreover, the lumber standards vary dramatically between countries and in many countries the rules are complex and difficult to interpret. This increases the difficulty in marketing Yukon products and penetrating the market place.

Competition from Scandinavia, Portugal and the USSR is very strong and expected to increase as the United States and South American countries begin entering the market place in the next few years. Language differences, customs regulations and various trade barriers also contribute to making it difficult for a small region like Yukon to enter the market place.

The Middle East and North Africa have been touted as possible market areas for North American softwood lumber products and considerable efforts have gone into attempting to market in these areas. However, the present prognoses for exports to nations in these regions is not good.

Australia is a major forest products producer in the world and exports to this country look poor. Australia has large domestic forest potential and is attempting to become fully self sufficient in forest products. The country is developing radiata pine plantations to meet the demand for construction and joinery materials, pulp feedstock, and panel products. Analysts are predicting that these factors make Australia a poor export prospect for the standard products that Yukon produces. Only selected specialty products from old growth Douglas-fir, cedar, and Sitka spruce are expected to remain in strong demand and Yukon does not produce these products.

India is one market area that may hold some opportunity for Yukon and should be explored more fully once the territory establishes an export trade business. India has recorded solid growth in its economy over the past decade and this growth is expected to accelerate in the future. India is a very large consumer of wood products using more than 250 MM m^3 annually, primarily in plywood, but with some 14.5 MM m^3 of solid wood for construction and joinery purposes.

India was expected to have a wood shortfall of 5 MM m^3 by 1987 and this shortfall is expected to grow over the next twenty years. Furthermore, the government is opening up the economy and reducing tariffs for many products from 100% to 10%. The Indian market is also fragmented, with no clearly superior exporter to the region, and the market distribution system is not controlled by large firms. Clearly, the combination of lower import restrictions, a growing economy, a shortfall in forest products and a new market area makes India a prime possibility for future development. Close attention should be paid to the India market and efforts made to exploit opportunities if they materialize.

4.6 Yukon's Competitive Position in Offshore Markets

While prospects appear good for the sale of forest products in selected Pacific Rim countries and the United Kingdom, the question that remains is whether or not the products can be delivered at a competitive price. Table 18 outlines an estimate of the costs of producing and delivering both lumber and logs to Japan. Delivery costs to Korea were quoted at $15 Cdn/M fbm less than for Japan, while delivery costs to the United Kingdom were quoted to be $30-35 Cdn/M fbm more than to Japan.

Table 18 indicates that lumber costs delivered to Japan from Yukon would be about $385 Cdn/M fbm and to the UK would be about $415 Cdn/M fbm. The Yukon costs would be about $65 Cdn/M fbm more than that for the interior of British Columbia. Log costs would be $240 Cdn/M fbm delivered to Japan, about $25/M fbm higher than the interior of British Columbia. This would tend to indicate that Yukon would have some difficulty in competing effectively with British Columbia firms in this market except during buoyant times in the export market.

On the basis of selling price, Yukon logs appear to be competitive. The average spruce log price for all grades over the past 37 years in the Pacific Rim market has been $293.39 Cdn/M fbm ($68.39 m^3), leaving a profit of $53 Cdn/M fbm for the Yukon operator[21].

The most profitable option for Yukon in offshore trade is in the log export area. Many destinations in the Pacific Rim are willing to purchase logs, and the prices for good quality construction grade logs has remained high. The United States Pacific Northwest and Alaska derive substantial income from the sale of logs on the international market.

The export price for standard dimensional lumber, however, does not appear to strongly favor Pacific Rim exports at this time.

In the United Kingdom, the average value of lumber imports was $407 Cdn/M fbm, indicating that Yukon can supply products to this market region profitably.

4.7 Other Factors Affecting Competitiveness

Several international factors can significantly impact the competitive price of offshore markets. Domestic productive efficiency, domestic transportation costs, exchange rate differences, changes in ocean shipping rates, and tariff barrier differences can significantly affect profitability.

First, improvement in the efficiency of forest operations that reduce milling costs can improve competitiveness. Firms in the interior of British Columbia have

TABLE 18. Estimated costs to deliver logs and lumber to Japan

	Yukon		British Columbia	
	Logs	Lumber	Logs	Lumber
	(CDN $ /M fbm)			
Wood costs	95.19	95.19	87.63	87.63
Stumpage	1.20	1.20	5.83	5.83
Milling costs	0.00	145.00	0.00	104.00
Delivery costs*	132.00	132.00	115.00	115.00
Handling costs**	7.50	7.50	7.50	7.50
Total	235.89	388.84	215.96	319.96

Notes: see Appendix II

average milling costs of $104/M fbm and Yukon operators need to reduce their costs to within $15/M fbm of that figure in order to compete.

Transportation costs to tidewater also affect competitiveness. The present costs for transportation outlined in Table 17 are based upon the movement of lumber products by backhaul to Vancouver and then by ship to the final destination offshore. Backhaul rates south are very favorable today as transportation companies seldom have southbound freight. As such, they are prepared to lower their rates substantially. Backhauling on the White Pass ships might also be a possibility, yet handling and transshipment charges at the docks in Skagway and Vancouver appear to make this option unworkable.

However, if ocean transportation could be coordinated with the Curragh Resources ships and a special deal negotiated, it is possible to reduce costs significantly. Curragh Resources travels to Japan, Korea, Australia, and Belgium. If trips are coordinated, Curragh's shippers indicate they can provide larger ships, or use existing excess capacity where necessary, in order to accommodate Yukon's lumber requirements.

Curragh's shippers could not indicate the amount of savings possible from coordinating their shipments because it would depend upon the destination of Yukon's shipments, the volume of products exported, and the timing of the loads. However, they did indicate if Yukon could find markets in their destination ports, package loads of 1.2-2.0 MM fbm, and arrange for storage and loading, it was possible to achieve savings of up to $40 Cdn/M fbm[22].

Transportation costs can theoretically be reduced a further $15 Cdn/M fbm through the use of 160 000 GVW trucks to haul lumber to Skagway. Also, if Yukoners can develop specialty markets and strong customer loyalty, the prospects exist for a profitable export market.

Canada has gained dramatic inroads in Japanese and European markets in recent years due to lower value of the Canadian dollar relative to the currency of these countries and to our competitors, namely the United States and Sweden. As indicated earlier, a 1 cent increase in the Canadian dollar relative to the US dollar represents a $3/M fbm increase in the cost of Yukon lumber. Similar changes can occur between other trading partners that can enhance or reduce competitiveness.

Recent analysis from Chase Manhattan and other forecasting agencies indicate that the present dollar differential will continue between Canada, the United States, and Korea, will decline in relation to the strengthening British pound, and rise relative to Japan and China. If this occurs, the prospects for trade in the United Kingdom will rise while it will decrease in much of the Pacific Rim (Henley Centre 1987).

Ocean shipping costs in recent years have been amongst the lowest in the world as declining world trade and increased shipping capacity lead to fierce international competition. Rates have increased by 45-50% in the past year with increasing world trade, and prices are expected to continue to rise steadily in the next year. Rapid increases in shipping costs will favor firms able to supply large quantities of products. These factors in turn may affect smaller Yukon firms adversely.

5.0 NEW FOREST DEVELOPMENT OPPORTUNITIES

The discussion to this point has concentrated on the market prospects for forest products that are presently produced by Yukon firms. However, Yukoners have identified several other forest products that might prove to be viable. These products include: panel products, pulp and/or paper mills, pulp chips, finishing materials, and energy products.

In this section, each product will be identified and a preliminary assessment provided on the prospects for competitively selling the products. The discussion is intended to provide a broad perspective on the potential for development and will concentrate on summarizing existing study results. Feasibility studies will be required before government or industry could make final decisions.

5.1 Panel Products

Panel products include products such as plywood, medium density fibre board (MDF), particle board, and oriented strand board (OSB)/waferboard. These products are largely substitutes for each other for use in home construction and furniture and cabinet manufacturing. Growth in these types of products has been fairly rapid in recent years, with several facilities being built in the northern half of Alberta and British Columbia.

A panel products manufacturing plant in Yukon would be highly desirable in terms of stable employment and value-added manufacturing. Unfortunately, the prospects for a viable panel board plant in the territory appear to be low at the present time.

Several recent studies in interior Alaska on the potential for plywood, particle board, and oriented strand board (Leonard Guss Assoc. Inc. 1977, Columbia Engineering International Ltd. 1982, and Merhkens 1983) have unanimously concluded that panel plants are presently not viable in the north. The researchers indicated that panel plants were not feasible because the domestic market was too small and the export potential was limited, southern producers had a production cost advantage that allows them to sell their goods in the north at lower prices than a domestic plant, and wood supplies to support these plants were not assured.

5.2 Pulp and Paper

The possibility of establishing a pulp and paper mill in the Yukon has been the subject of discussion for many years. Foresters tend to agree that there are sufficient forest resources to support such a pulp facility in the Yukon. Gairns (1967) indicated "that there are two probable sites for pulpmills which together has sufficient forest reserves to supply 400 000 to 600 000 tons of pulp annually. Denmark (1984) felt that the forest service could "safely predict that wood reserves will handle at least two pulpmills of 750 tonnes/day capacity, producing about 500 000 tonnes of pulp annually." And analysts contacted in this research who were knowledgeable about Yukon's forest indicated that the forest resources appeared to be sufficiently large to accommodate at least one pulp mill facility of 500-750 tonnes/day.

Moreover, Yukon has advantages that favor pulp and/or paper production. The forest resource can produce a high quality paper product due to the close-grained nature of the wood and very little air or moisture space in the wood fibre. This produces a paper that is stronger and much whiter than other fibres. A large portion of the available resource is on terrain that is conducive to the use of high volume lower cost harvesting techniques. The climate is conducive to economic winter logging and there is a large potential for developing cheap hydro-electric power.

However, there are several major disadvantages to establishing a pulp and/or paper facility in Yukon. These factors include the nature of Yukon's forest resource, the economics of establishing a mill, the changing nature of competition, the world market situation and trade offs between forest and alternative uses of land based resources. The disadvantages appear to be so large as to preclude a pulp and paper mill until at least the end of this century.

Yukon's forest stands produce lower wood volumes per hectare and have longer regeneration periods than other nearby producing areas. These factors tend to indicate that a Yukon mill is more likely to experience higher harvesting costs than elsewhere and require government to set aside larger forest areas in order to provide sufficient forest resources to sustain an ongoing operation.

Bickerstaff and Honer (1985) indicated that Yukon had an average volume yield on stocked land of only 51.7 m^3/ha. This yield is less than half that of Canada as a whole (108.6 m^3/ha). Even the interior of British Columbia is reported to have yields that significantly exceed the Yukon's. As well, the territory's forest stands are often discontinuous, requiring firms to move frequently in order to harvest the resource. These results indicate a need in Yukon to harvest much larger numbers of trees over a larger area than elsewhere in order to feed a Yukon plant.

Wood supply, however, is likely to be a small constraint to a new facility in comparison to other economic factors that inhibit project development. Energy costs are likely to be a major constraint to development as are

TABLE 19. Comparison of costs for a BKP, CTMP, and CMP mill in northern B.C., and a CTMP mill in Yukon

	B.C.			Yukon
	BKP	CTMP	TMP	CTMP
		(Million 1984 CDN$)		
Capital costs	450	112	120	138
		(1984 CDN$/ADMT)		
Manufacturing costs				
Wood	148	70	75	100
Energy	44	80	67	94
Labor	61	28	30	34
Chemicals	51	60	100	72
Other	50	47	53	56
Delivery	88	88	88	88
Total	442	373	413	444

Source: Hipp Engineering 1984 and Data Resources Inc.-data series.
Notes - See Appendix IIIfor more detail

higher operating costs due to the isolated nature of the facility.

Table 19 shows that the Yukon facility would produce pulp at a cost of $444 Cdn/Air Dried Metric Tonne (ADMT) or $70/ADMT higher than an equivalent CTMP mill in northern British Columbia. The costs are more competitive when compared to a BKP mill but only marginally better for a TMP mill. Yukon, therefore, would be uncompetitive with newly established mills in northern B.C.

The major constraint to the viability of CTMP pulpmill in Yukon at the present time is energy costs. A Yukon plant would face energy costs that are $27-$50/ADMT more than mills in the interior of British Columbia. A CTMP mill for example, uses 60-75 megawatts of power each year to manufacture pulp and paper products, a significant portion of which cannot be supplied by cogeneration of waste products from the operation.

The Yukon pulp mill would have to build a facility to generate its own power. This would require a ten year lead time and based on studies done on Yukon's hydro potential (Monenco Consultants Pacific Ltd. 1983), the least expensive power proposals would see rates at 4.0 cents/kwh; the rate used in the estimate in Table 19. Power, on the other hand is available in British Columbia and Alberta at rates of 1.5-2.0 cents per kwh on long term contracts and in these regions the government has readily available energy from existing hydro facilities.

Market conditions also play an extremely important role in determining the future prospects for pulpmills in Yukon. Most pulp and paper mills require easy access to large markets in order to be economical. Given that Yukon's total market demand for all pulp and paper products would be only about 1013 tonnes, (two days of production), Yukon would have to find offshore export markets for virtually 100% of the product[23]. This is risky, especially in the highly competitive and highly cyclical worldwide pulp markets.

The declining availability of timber rights in British Columbia has lead some Yukoners to speculate that further pulp requirements would dictate a mill location in the territory. There is no doubt that British Columbia producers have reached the limits of the annual harvest of the forest, with Hay-Roe speculating "it is chip supplies which are the limiting factor in the (pulp) industry's expansion"[24].

However, changing technology, expanded use of existing wood species and greater efficiency are slowing any move into new areas. The use of new chemical–thermal mechanical pulping techniques rather than bleached kraft production results in 90% rather than 40-45% of each tree being used. Expanded use of hardwood species for production of certain kinds of pulp and paper products reduces the pressure on the present spruce, pine and fir forest resource. And improved efficiency harvesting techniques is expanding the economically accessible areas within the

TABLE 20. Production and value of lodgepole pine cone harvest in Yukon, 1981-1986

	1981	1982	1983	1984	1985	1986
Production						
Cones (hl)	1268	2255	2355	2764	2386	2170
Seeds (kg)*	279	296	519	608	525	484
Value ($,000)*	101.4	180.4	188.4	221.1	190.0	173.6

Source: Canadian Forestry Service, Pacific Forestry Centre

* One hectolitre of cones produces about 0.22 kilograms of seed, and the cones sold for an average of $80/hectolitre in Yukon over the period.

existing producers regions.

All of these factors mitigate against the location of a mill in a more isolated region such as Yukon, that has higher costs and smaller domestic markets than competing suppliers.

5.3 Pine Seed Exports

Enthusiasm has been high in recent years about the prospects for expanding the pine cone production in the Yukon. At the present time there are a handful of pine cone pickers in the Yukon, harvesting lodgepole pine cones for export of seed to Scandinavia.

Table 20 outlines the harvest and value of production for the past few years. Annual production has averaged just over 2400 hectolitres of cones per year in the 80's, and the harvesting has created 6-9 person-years of employment annually.

DIAND's Forest Resources Division reforestation program will need to harvest about 500 kilograms of spruce seed each spruce seed cycle (4-10 years) in order to accommodate the 50 kilograms of seed required each year to restore logged areas. This demand would have only a minor impact on the industry's operations.

The possibilities for further exports appear good at the present time. Yukon harvests an OECD certified seed that is considered amongst the highest quality in the world and has found a relatively stable market in Sweden over the past few years. Sweden has developed a variety of seedling facilities throughout the country using Yukon's seed and expects to be able to harvest its own seed within a decade.

As Sweden begins to slowly reduce its demand for seed, the major seed wholesalers predict that other European countries, most notably Norway and Denmark, are likely to begin purchasing larger quantities of seed. Further work should be done to visit these countries with a view to determining the interest for increased sales of spruce and pine seed to these countries.

Experimentation and research in Yukon should also be undertaken with a view to devise new strains of spruce, pine, fir or other species that would provide a better quality, faster growing tree in various parts of the world. With the use of genetic manipulation, the prospects are unlimited for the development of new types of tree products.

Yukon could become involved in this technology through Yukon College as a means of stimulating the forest industry and employing personnel through indirect means. Such research should be considered by government as a means of direct job creation, long-term technology development and support to Yukon's forest industry. Alaska, through the University of Alaska and the United States Forest Service undertakes significant forest research. Yukon and Canada could benefit from a similar operation in the territory.

Cone harvesting is not likely to become a major force in forest employment, but it can provide a steady income for a number of Yukoners and has the potential for some expansion in the near future. Further income and employment can be provided if a seed extraction facility were built in the territory. Presently, Yukon firms sell their cones to seed wholesalers in British Columbia who extract the seeds and sell them to the Swedes. While Yukon firms may get as much as the equivalent of $250-300/kg of seed for the cones they sell, the British Columbia firms can reap as much as $1500/kg for the seed they sell abroad.

Investigation of the viability of establishing a pine seed extraction facility is presently underway and the results of that study could lead to the development of a seed extractor in the territory.

5.4 Pulp Chips

One of the most promising areas for Yukon's forest industry is in the production and export of pulp chips. Previously in the report, the advantages of using wood chips for industrial heating were outlined. Potential also

may exist for the export of wood chips for use as feedstock into southern pulp and paper operations.

Yukon is in a good location geographically to export pulp chips to either southern British Columbia or offshore. Spruce chips continue to retain a preferred position in world pulping processes due to the close grained nature of the fibre. Interest has been expressed recently by British Columbia and Swedish firms in acquiring access to Yukon's wood chips. The Pacific Rim, especially Japan, is also a prime offshore export market.

5.4.1 British Columbia wood chip markets

Makin Pulp and Paper Ltd. is the second forest company to express an interest in developing Yukon's pulp chip potential in the past fifteen years[25]. In early May 1987, the company announced interest in utilizing pulp chips from southern Yukon as feedstock in a 500 tonne/day pulp and paper mill at Britannia Beach, British Columbia. The firm would require 57 000 m^3 of spruce pulp chips in 1988 with production rising to 125 000 m^3 per year by 1990. This total represents 25% of the total fibre requirement, with British Columbia hardwoods being used as the other 75% of the fibre requirement.

Makin Pulp and Paper has approached Yukon because the company has no access to long term softwood timber supplies in B.C. and would be required to rely on the open pulp chip market or foreign suppliers for their softwood chips. To maintain profitability Makin officials indicate they must obtain a secure long term supply of chips at a price which is not prohibitive[26].

Using data supplied from Alaska and Makin Pulp and Paper, Table 21 outlines a preliminary estimate of the costs for producing and shipping pulp chips from southern Yukon to Vancouver.

It is estimated to cost $213 /bdu to transport the chips to Vancouver. With the present price in the Pacific Rim Log Market Report set at $82.00 /bdu, it appears that spruce chips cannot be supplied competitively from Whitehorse to the Vancouver market. However, if special backhaul rates are obtained from freight carriers, and special containers used, it is possible to move pulp chips from Hyland Forest Products for approximately $70/bdu, making the total costs approximately $158/bdu, or twice the Vancouver price.

Moreover, the price impact on Makin's operation is also not as severe as it may seem. Since spruce will constitute only 25% of the firm's feedstock, the overall cost of wood would be $20–25/bdu more than the present market price in Vancouver.

Furthermore, the pulp chip prices today are cheaper than they were in 1981 and are expected to rise in the future. Clear Visions Assoc. (1986), and Widman (1987), predicted that the market had bottomed out in early 1987 and wood chip prices would rise from $80 /bdu to approximately $100 /bdu by plant opening in 1990. Several new pulp and paper facilities have opened recently or are under construction creating a much greater demand for pulp chips than was the case in previous years. At the higher price levels the Yukon's pulp chips will be competitively priced.

The creation of a viable pulp chip exporting market provides an opportunity for the improved profitability of Yukon's forest industry. If pulp chips can be produced as a bi–product of lumber production, as it is in most parts of British Columbia, there is improved lumber recovery, higher product revenues, and very small additional production costs.

However, pulp chips have to be produced to exacting standards and existing operators in Yukon are not in a position today to produce those pulp chips.

5.4.2 International markets

With respect to the international market for pulp chips, the major market opportunities are in the Pacific Rim with Japan being the dominant importer. China, Korea, and Taiwan also provide some opportunities. As well, European producers have also expressed some interest in Yukon's wood supply and a Swedish firm has made preliminary enquiries.

Shreuder and Anderson (1987) stated "if one removes the inter-continental flows between the Scandinavian countries and between Canada and the US, Japan imports accounted for 90% of the world's trade in wood chips over the period 1979–1984". Total imports of wood chips amounted to 12.293 MM m^3 in 1986 or 20% of the total timber imports of Japan (Table 16). U.S. and Australia, in turn, dominate the world trade flows to Japan.

Canada has been successful in increasing its sales in pulp chips to Japan in recent years, improving its market share from 2% of Japan's pulp chip imports in 1977 to over 10% in 1985. Moreover, Shreuder indicated that "the

TABLE 21. Estimate of costs for producing and shipping pulp chips from Yukon to Vancouver

	$CDN/bone dry unit (bdu)
Wood Costs	53.00
Mill Costs	35.23
Transportation Costs	110.20
Handling Costs	15.00
Total Costs	213.25

Source: Pierce (1986), Makin Pulp and Paper, pers. comm. with transp personnel
Notes: see Appendix III

Japanese are hopeful that Canada can assume a more dominant role in the future supply of wood chips". Canada's exports are expected to rise from 1.046 MM m^3 in 1985 to 1.48 MM m^3 of wood chips by 1995. This would increase their share of the market to 16%. These increases are proposed despite estimates of only modest growth in Japanese demand for pulp chips over this period.

The ability of Canada to supply the needs of the Japanese depends on the domestic needs of Canada's pulp producers. With domestic production of pulp chips exceeding demand in British Columbia more pulp chips have been shipped to export markets in recent years. However, the British Columbia pulp industry has been expanding rapidly since early 1986 and a much lower volume of pulp chips are expected to be licensed for export after 1990.

As the Japanese demand for chips increases while the supply of British Columbia chips declines, the potential for Yukon pulp chips should grow. The opportunity for Yukon is enhanced by the fact that the Japanese wish to have diversified sources of supply and are not anxious to continue to allow the United States to maintain its present dominance of 60–70% of the market. Hence, with the prospect of less British Columbia production and less desire for United States products, the prospects for Yukon are much brighter.

Furthermore, Shreuder and Anderson (1987) predicted that Yukon's spruce-pine-fir (SPF) would be in high demand in Japan as these white species produce high quality chips in their thermal mechanical pulp mills, manufacturing thin high-strength newsprint.

The Soviet Union (USSR) remains Yukon's main competitor for chips as it is for other export products. The Soviet Union's larch could compete successfully for a larger portion of the Japanese market but poorer pulp chip quality, chip contamination and unreliable deliveries have undermined the Soviet's position in past years. Improvements are being made now, however, analysts believe it will be some time before the Soviets can make major inroads in the Japanese market.

Predicting the future growth in chip trade brought about by the emerging pulp and paper industries in developing nations such as China, South Korea, and Taiwan is difficult. However, one point stands out; these countries face serious raw material supply constraints, especially Korea and Taiwan. The ability of these countries to expand pulp and production capacity in the future will depend on their ability to locate new sources of import pulpwood. Wood chips from Yukon could be one of those sources of supply.

Of course, the product must be supplied at a competitive price and in reasonable quantities. Yukon wood chips are presently uncompetitive on the Vancouver market and would have to develop a transportation advantage between Yukon and Japan in order to compete. Such an advantage is possible due to the shorter transportation distance to Japan but the direct transportation advantage depends upon the production of large volumes of chips to support the use of cost effective wood chip bulk container ships that are available in Vancouver. Yukon would have to substantially increase the production of woodchips or negotiate a special transportation agreement with a bulk shipper to haul Yukon's forest products. The Curragh Resources ships are another possibility but it would require Yukon firms to develop methods for containerizing the chips in such a way that they could be shipped inexpensively on standard ships.

A pulp and paper industry does not appear to be viable in Yukon until at least the 21st century and the export of pulp chips becomes an alternative means of better utilizing the forest resource. Pulp chips can be processed from smaller less valuable trees recovered during harvesting and from wood residues at sawmills. This improves wood recovery and enhances the profitability of firms.

Moreover, if properly managed, the cleared area will provide a more valuable and cost-effective second growth. An intensive forest management procedure, such as this, provides increased rationale for the development of an indigenous seedling production facility and seed cone extraction facility.

The market potential in pulp chips for most developing nations can only be assessed first hand and the most appropriate method to determine this demand is through organized trade missions to these countries. Yukon's industry people and government should give serious consideration to engaging in a systematic first-hand assessment of major market areas.

5.5 Finishing Materials

Interest has been expressed recently about exporting finishing products, joinery materials and log home kits to various nations. At present, there is only a very limited production fo these products, usually for custom uses.

In the earlier discussions on export trade, there was an indication of increasing demand in Korea, the United Kingdom, and to a lesser extent, in Europe for joinery products that can be used in their furniture, window, and door manufacturing industries.

Consumer taste in these countries is moving toward natural stained finishes on joinery products. This makes Parana pine from Brazil and lodgepole pine from Canada, preferred species. Given the quality of Yukon's lodgepole pine, with tight grain and few knots, an excellent opportunity exists to develop markets for specialty products to supply the joinery business in several areas of the world.

Recent discussions with officials of the British Columbia Council of Forest Industries indicate that there

is room for Canada to supply 3–4 MM fbm of lodgepole pine to the United Kingdom in 1987 and possibly several times more to European countries.

The Yukon should develop specialty mills which would produce lodgepole pine in various sizes and also use finger jointing, end gluing and EDGAR (edge, glue, and rip) systems to laminate small dimensions of pine into various lengths and widths. Experiments might also be undertaken using spruce or poplar species to produce various types of laminated products.

Yukon firms could specialize in the production of the basic components and ship the product to wood manufacturers abroad. The foreign manufacturers would then produce the final products such as doors, windows, and furniture.

Recently, Gregory Forest Products of Ft. James received financial assistance from the British Columbia and Federal governments through the British Columbia Industrial Development Subsidiary Agreement to redesign their mill[27]. The redesigned mill will produce special metric sized lodgepole pine for export to various European joinery markets. Ft. James and Yukon are both isolated regions and have a similar product mix available to them, suggesting that it could be feasible to build a specialty mill in Yukon.

The Yukon government should conduct a thorough feasibility study of the profitability of a specialty facility in the Yukon, particularly if the Yukon Development Corporation plans to expand their mill facility at Watson Lake within the next few years.

Window production facilities also appear to have some potential. Northern Windows, a local Whitehorse firm has been successful in producing vinyl windows and exporting the product to firms in Western Canada. The availability of backhaul freight and favorable business taxes are reported to be responsible for making the project viable. Wood window production facilities might also be viable for export to Western Canada and possibly offshore. Further investigation of this possibility would also be useful.

Roof trusses are also manufactured by two Yukon companies, located in Watson Lake and Whitehorse. This type of a value-added product is highly desirable as an export but early indications are that export markets outside of the Mackenzie Delta are likely to be difficult to accommodate. Roof trusses are more difficult than lumber to transport and are most often built in plants located very close to the markets. Moreover, the equipment for manufacturing trusses is very portable and can easily be moved to the market place. Hence it is unlikely that export markets could be found for this product.

Log cabin construction has also been suggested as a good export product. Klondike Cabins of Watson Lake are the only producers of milled log kits in the territory. Several other firms produce custom natural round log homes and sawmills can produce standard cabin logs, 6" x 8" and rounded on two sides. Logs for about 20 natural homes are sold in Yukon each year and several hundred thousand fbm of house logs have been sold to several Alaska communities in recent years. As well, some logs are sold to Yukon Log Homes in Surrey, British Columbia. Present log cabin sales are relatively small, in the order of 300 M fbm annually, with most of the demand being generated for recreation homes.

Yukon prospects for log exports to Alaska appear to be excellent. Alaskan's have a long term acceptance of log homes, and demand for log homes remains strong. As well, the timber supply in the interior of Alaska is limited to less than one third of the average consumption in the region and the prices of natural logs have been rising rapidly in recent years. Yukon firms will still face competition from over 60 log home building companies in Alaska, but based on past exports from Northern Canada to Alaska, there is demand for at least 1 MM fbm in log home kits each year.

Expanding log sales to southern Canada and offshore is expected to be very difficult as federal, British Columbia and Alaska government officials outlined several impediments to market development.

Yukon operators face strong competition from a broad variety of log home building companies throughout Alaska and B.C. Sampson (1986), for example, indicated that 60 of the 100 smaller sawmills in Alaska produce cabin logs for local sales and Smith (1987) indicated that well over 100 log home building firms exist throughout British Columbia. As well, Yukon firms face very strong competition from large national wood home companies such as Panabode, Lincoln Log Homes, American Lincoln Homes, and Lindal Homes.

Yukon firms tend to face higher costs for energy, operating, and transportation than firms located in the interior of British Columbia. As well, Yukon producers are more isolated from the major buyers who are located in Vancouver and Seattle. This makes it more difficult to be price competitive in export markets.

Yukon log homes, like those throughout Canada, are not produced to an established standard of quality and do not have Canada Mortgage and Housing Corporation approvals. Several log home builders contacted during research for the paper, indicated that the CMHC required builders to perform several types of air infiltration and heat retention tests in order to prove the ability of log homes to meet CMHC standards. Without these tests there is no CMHC approvals and log home builders are therefore excluded from most of the standard house markets in Canada. As well, the lack of an established quality standard increases the difficulty in marketing their products offshore as buyers cannot be assured that they will

receive a consistent quality product.

Log home building is largely a specialty business and is not designed for larger scale production. It is difficult for log home builders to respond to export orders from the Pacific Rim that normally come in lots of 20, 50, and 100 units. Federal government officials have suggested the creation of a cooperative marketing system as a means to pool production and increase exports but to date this system has not been endorsed by operators.

Marketing has been difficult for log home builders in Western Canada according to government officials. Log home firms have shipped inferior products in the past, individual home builders have publicly criticized the Canadian log home industry to offshore customers and some contracts have not been fulfilled by log home building firms. This has given Canadian log home builders a poor image in export markets, making it difficult for small Canadian firms to compete.

A Yukon log production facility cannot survive on the small demand by recreational cabin owners in the territory and export markets out of the Yukon appear to be difficult to penetrate.

5.6 Other Energy Products

Several other energy products such as wood based thermal power generation, wood pellets, charcoal, and densified logs have been considered as possible projects for use of Yukon's forest resource.

The use of wood residues (sawdust, bark, tree limbs) for thermal power generation can be competitive in certain instances. Pierce (1986) indicated that the prospects for wood-based thermal generation in Alaska looked good as wood products could be used to fire the furnaces, at a BTU cost that was 19% below that for coal. Moreover, there are four coal-fired power plants operating in the Fairbanks region, providing a ready market.

At present there are no thermal generating plants operating in Yukon but a plant was constructed in Watson Lake in the late 70's for the purpose of providing power to the local sawmill and community. Deloitte, Haskins and Sells (1986) in their study of the feasibility of the Watson Lake sawmill indicated that the power plant could save the firm more than $500 000 annually by burning wood waste. The present management of Hyland Forest Products has refurbished the 1.5 megawatt power plant and will use 1.25 megawatts to power their equipment. The $500 000 saving amounts to $25/M fbm and should allow the firm to substantially reduce costs, while increasing the resource use. The remaining 0.25 megawatts could be made available for sale on the local electrical grid. A feasibility study is presently underway to determine the viability of distributing the power to the community.

The Yukon forest industry needs to make better use of its forest resource, and thermal electrical plants may prove effective in providing competitive hi-priced power using Yukon resources. Whitehorse had a coal–fired thermal generating plant operating in the forties and fifties and further increases in demand for peak electrical power could possibly come from wood–fueled thermal generating facilities. This activity would complement the wood-fueled hot water heated central distribution system being installed by Klondike Heating in Whitehorse. Further research and analysis should be undertaken to determine the feasibility of wood-fired thermal electrical generation in concert with any efforts being undertaken by Yukon Hydro to expand the power capacity of the territory.

Wood pellets, charcoal, and densified fuel logs have also been considered as possible products. At present there is no market for these products in Yukon.

Firekilled solid fuelwood dominates the heating market, while coal and wood residue fuels are attempting to penetrate. As indicated earlier, the domestic heating market is likely to be dominated by solid fuel for several years as the consumer has largely converted to solid fuel stoves and these stoves are not set up to easily convert to heating with alternative fuels.

Wood pellet plants are also capital intensive and investors would find it difficult to compete against alternative fuels. Solid fuelwood firms need only $10 000 in capital equipment to begin operations and can supply product to the market place for $45-50 Cdn/cord. Wood pellet plants are far more capital intensive and need to operate at high volumes to be able to keep costs low. Pierce (1986) indicated that a wood pellet plant in the North would require an investment of $2.6–3.0 million.

Pierce (1986) felt that the prospects for development of a pellet plant in the interior of Alaska were poor, even with coal-fired thermal generating capacity that pellets would supplant. In Yukon, the smaller market, the lack of penetration of the industrial space heating market, consumer resistance to pellets, competition with wood chips and solid fuel, all indicate that a wood pellet system would have difficulties. However, the viability of using wood pellets in the industrial markets or as part of a thermal generator should be investigated during any comprehensive evaluation of ways of supplying power to the territory.

Charcoal and densified fuel logs are alternative products that could be manufactured from Yukon timber and have been studied in some detail in the interior of Alaska (Schreuder 1985; Sampson 1985). The charcoal market study indicated possible markets in the Pacific Northwest and Japan for bagged briquette type charcoal, while Korea is identified as a possible market for bagged or lump charcoal. These studies did not assess the economic feasibility of exporting these products, but Yukon firms or the Yukon Government should evaluate the feasibility of such exports.

Other new forest based energy products are also being developed and Yukon should undertake research to investigate these new products and their potential viability in Yukon. For example, Forintek, a forest products research organization in Canada, has developed a process to break down wood chips into ethanol and related fuels, using pure enzymes. Forintek is looking for financial assistance to test the proposal and this type of operation may be of benefit to Yukon where energy costs are high. Further investigation is required to determine the projects feasibility.

5.7 Other Products

At various times, several other products have been considered as possible targets for development, including wood preservative processes, glue-laminated beam plants, and new dimensional lumber manufacturing processes, such as parallam construction. Products such as animal bedding, landscaping materials, and sawdust for shop clean-up, have also been considered.

5.7.1 Wood preservation

Peschke (1986) proposed the consideration of the development of a wood preservation plant in the Yukon in order to accommodate demand by local retailers for treated items for areas such as basements, decks, posts, and fencing. One small wood preservation facility operated near Whitehorse for a few years supplying railway ties to the White Pass Railway. The facility closed during the midst of the Yukon's recession, in 1983, shortly after the closure of White Pass Railway.

To be successful a wood treatment facility would require a steady demand for about 4000 m^3 of treated material. Local demand for treated wood, based upon conversations with local distributors, was estimated to be about 850 m^3.

Potential domestic markets may exist for treated fence posts and railway ties, increasing the domestic market by 1500–1600 m^3 annually. The Yukon Government has passed the Yukon Pound Act, requiring owners to fence agricultural areas abutting major highways. This could add 500-600 m^3 to the market for treated materials.

As well, the White Pass Corporation is in the process of re-opening the White Pass Railway as a summer tourist train and it is estimated that the summer railway could use 10-12 000 railway ties per year, adding upwards of 1000 m^3 to the market.

If a pressure treated facility were used to treat the materials, there is an added domestic market for about 13 150 m^2 of plywood for use in wooden basements.

Total domestic demand for treated wood products is not likely to be sufficient to support a treatment plant and export markets would be required. The interior Alaska market is considered to be an excellent export market for treated products. Data on the Alaska demand for treated materials were not available but comments from Fairbanks retailers indicated that the market would approximate 2000 m^3 annually.

The interior Alaska region has only a limited supply of domestic material that can be used to produce treated lumber and no wood treatment plant exists in the area. The nature of the cell structure in the spruce fibre, Fairbank's dominate commercial species, makes it almost impossible to treat with standard processes.

If Yukon can penetrate the majority of the Yukon and interior Alaska markets, the potential exists for a viable wood treatment facility.

5.7.2 Glue-laminated beams

A glue-laminated beam plant has also been considered a feasible venture. Deneki Corporation (1986) undertook a study of the feasibility of a glue-laminated beam plant in Yukon and concluded that such a facility could be viable, if the operator received government financial assistance and government purchase guarantees of 225-250M fbm/yr for five years. The Yukon and Alaska markets were targeted for consuming most of the production.

The large amount of financial assistance required for the project demonstrates its high risk. This risk is compounded by several other factors. First, the market for glue-lam beams in Canada has declined steadily over the past twenty years, from a production level of 35 MM fbm in 1965 to just over 10 MM fbm in 1985. The glue-lam business has consistently lost out over the years to competitors such as steel, reinforced concrete and now parallel laminated veneer lumber, due to higher costs, greater likelihood of damage during construction, and increased reluctance of architects and engineers to utilize the product[28]. The long-term trend appears irreversible at the present time.

5.7.3 New dimensional lumber

Laminated veneer lumber (LVL) and Parallam-brand parallel strand lumber are two new forms of lumber products that may be feasible to produce in Yukon. These products have bending, tension, and compression values that exceed No. 2 grade common lumber and are just slightly weaker than machine stress rated products. Moreover, the variability in the strength between different boards of standard lumber varies by up to 30%, while the variation between LVL and parallam boards is only 10-12%.

When considering the chances to have such a plant in Yukon, it must be remembered that these products suffer many of the same disadvantages as panel board. These production processes use large quantities of resins which must be imported, require large scale production

facilities to be most cost effective, and efficient transportation systems. As such they are usually located close to large domestic markets.

Nonetheless, the world markets for these types of products appears to be large and MacMillan Bloedel has announced it will spend more than $90 million in marketing the product in the next few years and will spend more than $250 million building production facilities in various sites in North America. A prefeasibility assessment should be done by the government to ascertain the potential for the establishment of such facilities.

5.7.4 Miscellaneous products

Several other wood residue products should be evaluated for their potential in Yukon markets including sawdust for animal bedding, bark for use as a landscaping material and sawdust as a component in products for cleaning industrial floors.

The Northwood Lumber Co. of Fairbanks Alaska has developed strong local markets for their sawdust. Today the company will deliver sawdust in truckloads to hobby ranchers for animal bedding, and even constructs mini silos to store the material, if requested. The sawdust is cheaper than other bedding materials, such as straw, and easily transported.

The firm also packages its bark and larger wood residue material into landscaping material for sale to local home owners. The firm has discovered that by covering the rougher materials with a layer of sawdust and leaving it for a year the spruce material will gain a dark brown color. It is being received favorably by local landscapers as a substitute for cedar.

Finally, the firm recently began producing a material called "dry floor" which combines sawdust with a moisture absorbing clay. This material is used in industrial settings such as automotive dealerships to absorb oil spills, to reduce dust during cleanups and so on. The machinery to produce this product has an inexpensive screen and hopper that deliver a uniformly sized and mixed product.

These products can all be produced by smaller Yukon operators and provide a means for disposing of residue in a manner that generates revenue rather than incurring disposal costs.

6.0 MARKETING STRATEGY

This study assessed the market potential of a variety of forest products produced in the Yukon and provided some comments on the prospects for developing new and viable forest products. The study shows that the most significant market opportunities for Yukon's forest industry exist within the territory itself and the first priority for development must focus on that market. Displacing the present imports will add substantial impetus to development.

Yukon firms must work to penetrate the entire 12-15 MM fbm market for sawn lumber products and begin to make greater use of the complete tree. Wood residue accounts for a substantial portion of the waste from sawn lumber production. This resource must be utilized if the industry is to be developed. Wood residues can be used for thermal generation, and wood-fuelled hot water heating systems, along with a variety of other uses including charcoal briquettes, animal bedding, industrial cleaning, and landscaping.

The Mackenzie Delta and Alaska markets are the second most important market for Yukon operators to target for development. While these markets are not presently active due to economic recessions, the longer term prospects are excellent. Efforts must be made now to begin to develop this market potential. Fuelwood exports to the Alaska Panhandle and Seattle appear viable and private firms should be encouraged to develop export contracts.

Offshore opportunities do exist for Yukon forest products, especially standard dimensional products in the United Kingdom and possibly China, India, and Japan. As well, specialty products are in great demand amongst Pacific Rim nations like Japan, Korea, and China and in many European countries. Specialty products bring a much higher value than standard products and should be pursued vigorously.

Log exports are also in high demand in the Pacific Rim and provide an opportunity to expand product sales through joint sales contracts. Korea and China are particularly interesting in this regard as they are prepared to purchase lower quality logs along with high valued specialty products. Moreover, the value added from most Yukon logs is likely to equal or exceed that of dimensional lumber.

Log exports should be given consideration as part of any export plan to sell lumber products to Pacific Rim countries. This allows small Yukon firms the opportunity to build a market niche in a market place that has traditionally been dominated by very large corporations.

Pulp chips remain the most likely other export product available to the Yukon forest industry. Pulp chips appear to be competitive with southern suppliers, and with declining supplies forecast in B.C., the prospects for supplying pulp chips to at least one operation look excellent.

Finally, the structure of Yukon forest companies dictates that a multi-pronged marketing system be developed. Hyland Forest Products, a government-owned, producer, is presently refurbishing its operation and when

this work is completed, the firm should be able to produce more than 20 MM fbm of good quality kiln-dried dimensional lumber products. This production level will be sufficient to meet all local demands and some portion of export requirements. The United Kingdom and Japan provide the best offshore opportunities in the immediate future.

The remaining forestry firms in Yukon are very small businesses capable of producing green or air-dried lumber products. These firms are not competitive in producing dimensional lumber, however, they are competitive in producing timbers, cabin logs, posts and poles, and in certain cases, in value-added products such as siding, boards, flooring, and joinery materials. These firms must be encouraged to develop and expand their specialty markets.

The marketing strategy must recognize the complementary nature of the production from large and small mills and capitalize on that advantage by marketing the strengths of each segment. Joint venturing with Hyland Forest Products should be considered and supported on all foreign sales.

Projects such as panelboard or pulp and paper mills would provide a large economic stimulus to Yukon's economy but several factors indicate that these projects are not viable for the foreseeable future.

The lack of basic data on timber quantity, quality and species continues to be an impediment to development of Yukon's forest industry. Many individuals believe that Yukon has a superior quality spruce and pine product that can be used to market distinctive Yukon products. No data exists to confirm or deny this fact.

Insufficient data are available on the quantity of available timber in Yukon. This makes it difficult, if not impossible, to do basic forest development planning.

Data on the location and volume of timber by various species are unavailable. The amount of economically accessible lodgepole pine versus spruce will have a definite impact on what products can be produced and how much of various products can be produced. Finishing materials markets depend upon a good supply of pine, and if this supply does not exist, then the potential cannot be realized.

There is a need for information on the volumes of different products that can be produced from trees of various sizes, wanes, and tapers, or product out-turn studies, as they are called. Some data are available for the interior of B.C., however, information on Yukon trees is important as the characteristics of the trees differ between the regions.

Any marketing strategy must be able to promote the advantages of Yukon's forest resource including quality, quantity, accessibility and volume. Forest resource data is the key to obtaining the information needed to promote the advantages of Yukon's forest products.

Finally, future development of the forest industry will be constrained if trends in the local and international forestry situation are not monitored. Only those firms or regions that are constantly aware of the changing market conditions will be able to adjust to the new realities and continue to remain competitive in the market. This is particularly true in smaller "last in-first out" regions like Yukon, where marketing plays a substantial role in maintaining market share. Extensive research must be done to provide the required information to the forest producer and to assist in adjusting to the changes.

To date there has been no concerted effort by industry or government to develop a cohesive marketing strategy to sell forest products. Peschke (1986) outlined some useful suggestions for industry marketing and Deloitte, Haskins and Sells (1987) provided information for Hyland Forest Products. However, no comprehensive marketing plan has been established.

If Yukon's forest industry is to develop it must create a strategy that is predicated on three major objectives, namely:

1. maximizing the use of Yukon wood products in the domestic Yukon economy;
2. develop and maintain unique niches in the export markets; and
3. conduct ongoing research and development to ensure that the industry can remain competitive under changing circumstances.

6.1 Maximize the Use of Yukon Wood Products

Throughout this report, it has been emphasized that Yukon's domestic market has the capability of accommodating all of the present Yukon production and a substantial portion of any expanded capacity. Opportunities exist to expand sales of sawn lumber, roundwood, and to develop markets for the sale of wood residue and specialty products. The principal efforts of marketing the forest industry should, therefore, be geared to capturing these market opportunities.

The efforts of industry and government should be directed to the following activities:

1. substitute imported lumber with Yukon lumber products;
2. encourage increased wood content in Yukon buildings, especially in the form of specialty products; and
3. encourage the conversion of industrial energy users to wood-based heating systems.

6.1.1 Substitute imported lumber with Yukon lumber products

Substituting Yukon lumber for imported lumber depends upon the production of good quality products at

competitive prices, expanding the use of products that Yukoners can produce competitively, and educating consumers about the advantages of Yukon wood products.

The local kiln-dried dimensional lumber market is not being met with domestic production. The refurbished Hyland Forest Products mill should have the productive capability in 1988 to competitively supply all the kiln-dried dimensional products that the local market can consume. Smaller Yukon firms must also be encouraged to develop specialty products to supply the market place, to produce air-dried lumber for sale and to improve the quality of their production processes. The success of all Yukon operators depends upon the actions of every operator. One firm producing substandard materials adversely affects all firms.

The key to ensuring that the market place is penetrated is to develop a program for educating Yukon consumers about the advantages of using Yukon wood products. This education program essentially would have three components: an accredited lumber inspection system that assures the consumer that he or she is purchasing lumber that meets national standards, demonstration projects that provide concrete proof of the capability of Yukon wood and an advertising campaign to educate Yukoners about the advantages of using Yukon wood.

In Yukon, the first step to success for the forest industry is for both levels of government to ensure that there is a strong industry association. Efforts should be made to further assist the organization to carry out its responsibilities for education, marketing, and development.

Yukon should create a unique image of quality and reliability. A special Yukon forest logo or the Yukon Made logo should be used by forest operators on all exports. The use of the single logo provides a unifying theme to Yukon's forest products and provides a more unique identifier that is useful in developing brand loyalty amongst consumers. Special packaging and an industry motto like "Quality-First, Last, Always" should also be seriously contemplated by forest operators to provide a distinctive advertisement to prospective customers.

A Yukon-wide advertising campaign should be developed to sell Yukon consumers on the advantages of using Yukon wood products in their home construction. The advertising would push product quality along with the economic benefits to the territory of purchasing the product.

Technical and advisory services should be provided to assist firms to modernize and diversify their products. Simple technical advice could provide low cost means of improving the quality of the sawn lumber, assist in establishing new small capacity kilns, and instituting training programs to instruct operators on proper air-drying techniques.

Firms should be encouraged to access existing government programs such as the Opportunity Indentification Program, the Small Business Loan Program, the Renewable Resources Subsidiary Agreement, and the Yukon Energy Alternative Programs. The existing programs provide financial assistance to allow firms to modernize equipment, identify new opportunities and markets, purchase small dry kilns, expand inventory, and undertake marketing initiatives.

Peschke (1986) proposed the establishment of an Office of Forest Development similar to that in Alaska and Alberta to provide the technical assistance and marketing expertise to develop the industry.

Government action should be taken to review the present purchasing policies to ensure that there are no impediments to using locally manufactured forest products. Alaska has similar policies and the NWT government is in the process of reviewing its purchasing program to ensure that there are no institutional impediments to using local wood.

The CMHC could help to dispel the misunderstanding with the consumer over the requirement of using kiln-dried lumber by providing more detailed information on the existing rules. By informing consumers that properly air dried lumber can be used, a base will be available for Yukon to penetrate the local consumer market.

Finally, government could initiate specific initiatives to assist the forest industry. Funds could be provided to build a demonstration home which utilizes Yukon wood and educates consumers about the advantages of using Yukon wood products. The possibility of a community kiln as recommended by Peschke (1986) could be evaluated and alternatives, such as allowing access to the Watson Lake kiln, explored.

Government could consider rebating the Federal sales tax to consumers who purchase Yukon lumber products. The Federal government imposes a sales tax of 8% on all sawn lumber produced in the Yukon. If the government rebated the tax, it would effectively reduce the cost of the product by as much as $20/M fbm and would act as an advertising tool to promote the product. At present the cost to the government would be less than $10 000 annually but could rise to $200 000 if the full Yukon market was converted to local lumber. The tax costs would be offset, however, by new sales of up to $3.2 million and income, employment and other economic benefits from the use of local as opposed to imported products.

6.1.2 Encourage increased Yukon wood content in buildings

Several states in the United States Pacific Northwest have seen demand for domestically produced products

increase by over 50% through an active program of industry/government cooperation to increase the amount of locally produced wood products in building programs. These states promoted building designs and construction techniques that favored the use of products that were competitively produced in the area.

In the Yukon, this means a cooperative approach by government and industry to encourage the development of new designs which can utilize materials produced by Yukon firms. Government could also agree to use Yukon wood siding rather than steel cladding on its buildings. The Yukon College is a prime example of maximizing wood content and new designs such as post and beam constructed buildings could provide markets for Yukon rough timbers. The Yukon government could finance the development of energy efficient home designs using post and beam construction. Post and beam construction would allow smaller firms to supply rough or planed beams for input into house construction. The use of locally prefabricated building components such as Nelson type homes or the NASCOR home framing system may be another method to increase the use of local wood.

6.1.3 Encourage conversion of industrial users from oil to wood-based heat

A major effort must be made to utilize 100% of each tree that is harvested, to assist the Yukon forest industry to be profitable. Industrial users provide the largest and best available markets for the use of wood chips and other wood residues.

The Yukon Government, through the Yukon Energy Alternatives Program, is investigating the feasibility of installing several more hot water heating systems in rural Yukon communities. These types of efforts must be continued and expanded in order to provide steady markets for wood residues. Moreover, the government should continue its policy supporting the development of wood based central heating systems such as Klondike Central Heating through efforts to provide guaranteed purchase contracts, loans and other financial assistance to the industry.

The Yukon Development Corporation is considering the feasibility of using wood residues in the thermal generating plant in Watson Lake. More wood residue could be utilized if other thermal generating facilities were established in other communities. The Yukon Development Corporation should consider the use of thermal energy as part of their long-term development strategy.

6.2 Develop a Marketing Strategy for Export Sales

In order to reduce the impacts of cyclical fluctuations in the Yukon economy and to accommodate expanded production, Yukon firms must look to export sales. The immediate northern regions of Alaska and the Mackenzie Delta provide the most promising markets but other regions should also be explored.

In order to ensure the greatest possible success in the export market place, there is a need to develop a comprehensive export marketing strategy and plan. The plan should key on ensuring high standards of product quality, distinctive Yukon products, co-operative marketing between small and large firms and individualized marketing through personal contacts directly with sawmills, wholesalers, and retailers.

In order to penetrate the world market, one needs a unique product that is recognizable and perceived as being superior. The distinctiveness of the product is likely to be as much in the packaging as in the product itself. Southern United States contractors ignore locally grown pine in favor of Canadian spruce because they "believe" it is a superior product.

The large firms should have an incentive to participate in the cooperative marketing system as it would ensure that Yukon firms are not competing with each other in the same market place and that all export products meet acceptable standards.

Several alternative methods are available to assist in the cooperative marketing approach including expanded use of the present brokerage firm on a prorated basis, hiring a full-time marketing person for all Yukon firms, creating a cooperative marketing arrangement within the Yukon Forest Industry association, and providing direct government subsidies to individual firms to assist in their marketing effort.

Possible inclusion of interior Alaska operators in such a cooperative export agency should also be investigated as it would provide a broader base for exports and add to the product volumes, thereby reducing transportation costs. Both regions could benefit from the joint exporting of similar products, in much the same way as the joint Alaska/Yukon tourism marketing is undertaken.

As indicated earlier, the most successful Alaskan log and lumber exporters have been those who have developed a personal working relationship with their consumers. Yukon's production levels are too small to compete against the large international forest firms by price alone, and consumer loyalty would, therefore, appear to be the key. Sales visits would allow Yukon operators to develop a one-on-one relationship with their customers, and also allow both parties to work cooperatively to develop products to meet the specific requirements of the consumer.

Regular contact between Yukon firms and their customers is a key part of this type of personalized marketing process. This would include visits by prospective customers to Yukon mills, trade missions by Yukon operators to prospective customers, provision of samples of the product for comparison, and introductory sales of specific products in order to ensure product match to

customer demands. This process will establish contacts with individual consumers and trade houses, both within the Yukon, and in the best potential market areas.

Trade missions to Fairbanks, Calgary, the North Slope, Juneau, and possibly the Pacific Rim and the United Kingdom are considered primary targets for the sawn lumber industry, while visits to Sweden, Norway, and Denmark should be contemplated by pine cone pickers. These visits, using existing government financial assistance, should be initiated each fall in order to develop orders for the next operating season and to establish consumer requirements prior to the start of the season.

6.3 Conduct Ongoing Research and Development

Ongoing research and development in the forest industry is a key component of any market strategy. In order to assess the supply potential of the industry, the forest inventory data must be collected and be made available. Highest priority must be given to completing the forest inventory.

Market research and information on the Yukon industry and its competitors are key elements in determining the most prominent markets to access. The sign of a good business is its understanding of its markets and its clients. Ongoing market studies are required as well as regular information exchanges between government and industry organizations.

Several products have been identified as potentially being viable and prefeasibility studies should be conducted. Fuelwood exports to the Panhandle, development of laminated lumber products, wood treatment facilities, seedling farms, pulp chipping operations, seed orchards, and some of the newer products such as ethanol extraction, laminated vinyl lumber, and parallam lumber were all mentioned for consideration.

Research into the use of wood residues for heating should be explored along with the prospects for wood-fueled thermal generation.

Research into new and different types of specialty products that might be produced in Yukon should also be undertaken by industry and government. The special Yukon siding developed for the Yukon College is one example of a slightly different product that can be produced for sale as an exclusive Yukon product. Wall panelling using poplar or aspen could be explored as could prospects for pine flooring and other products. As well, new architectural designs that favor Yukon produced products could be developed as well.

Research into methods to reduce transportation costs such as utilizing Curragh Resources ships, backhaul transportation on White Pass, and use of the Mackenzie River would assist the industry to reduce costs.

Finally, government and industry should conduct research into the quality of Yukon's present forests and methods to improve the quality of future forest stands. As indicated earlier, many people feel that Yukon produces a superior product in terms of strength and finish. To confirm this assertion product quality tests of selected Yukon timber must be undertaken. The product quality tests involve sawing a representative sample of logs to determine the quality of the product based on several criteria. If the tests prove that Yukon's forest products are of superior strength of quality, these results can be used as a tool to market the product.

The feasibility of using Machine Stress Rating amongst Yukon firms to ensure quality should also be tested. Machine stress rated lumber commands a premium on most lumber markets and exporting only these products can enhance the image of Yukon's forest products on the world market and help to ensure quality.

Product out-turn studies, which assess the quantities of various types of dimensional products that can be produced from logs of varying sizes, to determine the most appropriate mix of forest products to be produced from Yukon forests. These studies are extremely useful in matching production to market demand and in identifying the best possible products to sell.

The Yukon forests have proven to produce excellent seed for export in the past, it seems appropriate that further research be undertaken into the creation of new tree varieties and new forms of silviculture management. Yukon's seed has been used to develop new tree types in Sweden and the prospects for reciprocal work in Yukon seems appropriate.

The Forintek Canada Corporation, the Forest Economics and Policy Analysis Research Unit, and the Faculty of Forestry at UBC each indicated interest in developing a forest research program in cooperation with government and industry[29].

FOOTNOTES

1. Where ever possible the information in the report is provided in metric measurement which is the present standard in the industry. However, in certain instances such as lumber production it is more practical to provide the information in imperial measures.

2. Data were obtained from Norm Denmark, Forest Resources Division, Northern Affairs-Yukon and are preliminary estimates based upon the work of the forest inventory.

3. Productive forest land is defined by Bonnor (1982) as land capable of producing tree stand heights greater than 16.5 ft at a base age of 50 years.

4. It must be noted that the lack of a comprehensive forest inventory is essential to ensuring that forest companies can make informed decisions about the future size and quality of the forest resources that they wish to exploit and that other users and uses can be identified and accommodated before the exploitation begins. It is also essential for developing marketing strategies as the feasibility of certain products such as wood chips, pulp and panel boards depends upon an accurate knowledge of the forest resource.

5. The forest industry in Yukon, for the purpose of these studies, has been divided into two major components, namely primary producing and further processing.

6. The data came from a variety of sources including the Department of Indian Affairs and Northern Development, the Yukon Bureau of Statistics, the Yukon Forest Industry Survey, and studies and reports on the territory.

7. Operating ratios measure the extent of underutilization of the productive potential of capital stock and show the gap between potential and actual use of the capital stock (Statistics Canada 1978). The operating ratio in sawmills is taken as the average number of operating days divided by the engineered capacity of the mill. Bohning (1986) determined operating ratios for three sizes of NWT sawmills, as follows: 1 MM fbm and over -0.41, 100 M fbm-1 MM fbm-0.67, and less than 100 M fbm-0.16.

8. Fuelwood in Yukon can be divided into two components, namely solid wood and woodchips. Solid wood is usually fire killed spruce, pine or fir while woodchips consist of chips, sawdust or other forest residue obtained as by-products of lumber production.

9. "Permitted" fuelwood is the volume of fuelwood recorded on the fuelwood permits sold by the Forest Resources Division of Northern Affairs (DIAND) - Yukon. The permit information reflects "expected" production rather than "actual" production and is often felt to be an over estimate of actual production.

10. Using data from Energy Mines and Resources on energy use by various heating methods and employing current prices, the costs of various fuels per million British Thermal Units (MBTU), propane $24.00/MBTU, electricity $17.58/MBTU and oil $16.80/MBTU. The cost difference is even greater in rural communities where the price of alternative fuels is higher than that in Whitehorse.

11. The difference between revenue and savings is that wood costs are only about 35% of oil costs. Hence, the consumer saves far more than the producer earns.

12. Dimensional lumber has a series of grades as approved by the National Lumber Grades Authority (NLGA) in Canada. Basically, the NLGA classifies lumber into two width categories and five use categories. The width categories are those products less than 4 in. (100 mm) and those products greater than 4 in. (100 mm) and the use categories include: structural light framing, light framing, appearance framing, studs, and structural joists and planks. In addition, there are a variety of specialty products that can be produced including mouldings, panels, and siding.

13. A government contract in a smaller community has more impact due to the small size of most operators. A contract for wood for ten homes in a town is 50 000 fbm to 80 000 fbm which can represent a significant portion of the annual production for a small operator but represents less than one shift at Hyland Forest Products.

14. Assuming that all the local production of sawlogs and roundlogs were consumed in Yukon in 1986 and converting the total production from m3 to fbm, the total is 7965 M fbm. If consumption was 19.9 M fbm, then the Yukon share of the total market is about 40%.

15. Sasges, Michael, "South Interior Mills Expect Cost of Logs to Double" Vancouver Sun, September 25, 1987, p. C-4.

16. A lumber inspection system is used by the forest industry in Canada to ensure that the products produced by the industry meet accredited construction standards consistent with the National Building Code. Almost all house construction materials in Canada use lumber that has been inspected. In the Yukon only Hyland Forest Products is a member of an accredited agency that supervises inspections. Other firms in Yukon would benefit from the service.

There are three methods that can be used to establish a lumber inspection service, namely: have the Yukon Forest Industry Association establish a lumber inspection agency similar to that in the Northwest Territories, have firms affiliate themselves with the British Columbia Council of Forest Industries or have firms join an independent inspection agency such as the Pacific Lumber Grading Association.

Depending upon the inspection service used, costs range from 30 cents/M fbm at the Pacific Lumber Grading Association to 54 cents/M fbm at the British Columbia Council of Forest Industries. In Yukon, the costs are likely

to be much higher for most firms as mills are spread throughout the territory and the volume of production is low. In the Northwest Territories where sawmills face a similar situation, the Northwest Territories government subsidizes the costs of the service over and above a standard charge to the industry firms participating in the service. In the Northwest Territories, government contributes about $5 000 annually to the costs of the inspection service or about $0.25/M fbm produced. Industry members contribute $0.75/M fbm shipped to the inspection service.

17. Prescott-Allen et al.1987 p. 27. In this discussion paper for the Yukon Government's Yukon 2000 project, the authors quote N. Denmark as having indicated it would take 1 million seedlings per year for 10 years to replace the logged over areas in Yukon. This implies a deficit of about 10 million seedlings as major logging has really been in existence only for the past decade or so.

18. Assumes 1 million seedlings planted each year to meet existing logging and 1 million seedlings to cover the backlog. At the British Columbia standard of 1200 seedlings per hectare, it means that approximately 1667 ha of land would have to be planted each year.

19. The United States Forest Service has set a limit of 4 MM fbm on the timber harvest from the Tanana State Forest but the agency has been able to sell about 7 MM fbm in recent years due to agricultural disposal programs and fire salvage. The most recent Tanana Forest Management Plan recommends increasing the harvest to 10 MM fbm annually, but approval to proceed has not yet been provided by Congress.

20. In August, 1987, the author visited seven Fairbanks lumber distributors and determined that there was very strong interest in the purchase of good quality SPF from the Yukon. Initial indications were that there was good potential to immediately assume 2-3 MM fbm in sales, with further sales expected as the Alaska economy recovered.

21. B.C. Council of Forest Industries "Log Prices in B.C. 1947-85" unpublished data.

22. Based on the fact that British Columbia rates are believed to be $30-40/MSF cheaper than hauling by truck.

23. Hay-Roe, 1987a, p.4.

24. Hay-Roe, 1987b, p.2.

25. The previous firm was Brameda Resources who applied for a similar licence in 1969, but were denied access to the timber rights for chip production.

26. Comments made by Mr. Hugh Goodman, Vice-President of Makin Pulp and Paper Company during a

27. "North B.C. Sawmill Gets Aid" Whitehorse Star, August 14, 1987, p. 22.

28. Gower 1986, p. 42.

29. Forintek Canada Corporation is a non-profit government/industry financed firm whose mandate is to conduct research into all aspects of forest production and marketing. Dr. A. Howard is a professor at the University of British Columbia who has published extensively on product out-turn studies and on forest operations simulations.

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APPENDIX I. Study Methodology

This appendix provides detailed information on how the estimates of lumber consumption were calculated for Yukon, Alaska, and the Northwest Territories. Data on consumption in these regions is not readily available and estimates had to be obtained from various sources.

A literature search was undertaken and a variety of reports, studies and articles were obtained that provided estimates of forest product consumption. As well, a number of officials were interviewed to obtain their views on the most likely consumption patterns.

Finally, a small market survey was undertaken of the major forest products users in Yukon in order to obtain data on the magnitude of local consumption. The survey complemented a similar work undertaken in January, 1986 by Resource Intertrade. Unfortunately, the market survey data could not be used as there were insufficient respondents and the results were restricted to assisting to confirm the Resource Intertrade estimates.

1.0 Fuelwood Consumption

There are no firm statistics on the potential market for Yukon homes. However, using Statistics Canada data on the number of dwelling units and average home heating requirements, a reasonable estimate can be obtained. Statistics Canada, in the 1986 census, determined that there were 8143 dwelling units in Yukon. Loeks (1985) and McCandless (1987) indicated that the average dwelling unit would require approximately 6-8 cords of wood per year for space heating. On the assumption that each dwelling unit would use 7 cords per year, the total available market would be 57-001 cords or 129-221 m^3 of fuelwood. Using the population estimates for April/1987. it would mean a market of 2.12 cords or 4.76 m^3 per person.

However, the total potential market has to be revised downward to reflect the fact that not every dwelling will convert from oil to wood. Loeks (1986) gave three reasons why there would be a tendency for consumers to not convert to fuelwood use, namely; energy conservation grants were ending, wood burning was being perceived negatively due to pollution problems and consumer recognition of the handling, maintenance and other indirect costs of using wood.

Loeks (1986) and McCandless (1987) estimated that only 60% of Whitehorse homes have converted to wood use and that further conversions were not likely at present. Rural homes are expected to have closer to 90% conversion to wood due to a greater acceptance of wood in rural areas, a higher price for oil and more intensive marketing of the advantages of the energy subsidy programs. Using these assumptions the total potential market would be revised downwards to 77-582 m^3 (34-222 cords) or 2.88 m^3/capita.

The quality of the consumption data as provided by the forestry service in Yukon has also believed to be less precise than desired. The "permitted" fuelwood statistics are derived from the fuelwood permits in which producers indicate the amount of fuelwood they expect to produce; not the amount actually produced. Since the royalties are low on the fuelwood, many officials believe the data overestimates the actual production, especially in Whitehorse. Loeks (1986) reported that the production numbers could be overestimated by as much as 50% for Whitehorse.

On the other hand, some people cutting wood do not obtain fuelwood permits and hence their production goes unrecorded. This number, too, has been reported in annual reports of the Department of Indian and Northern Affairs as fairly substantial.

According to Loeks (1986) the official DIAND fuelwood production estimates "provide a good trend of consumption" and that both the consumption and the production figures would have to be reduced by relatively equal amounts. Since fuelwood operators tend to produce to meet local consumption because there is virtually no export market, it was decided to reduce the estimated production by an equal percentage to the consumption date. Estimates in Figure 4 were therefore adjusted downward by 21% for the period 82-87. Future estimates were based on a 5.5% population growth in 1987 and a lump sum increase in demand of 3500 m^3 in Taro in 1987. Future growth was set at 3.0%/annum until 1991.

Since both are overestimates, the resulting conclusions for this study remain valid. However, if a firm is doing a more precise market study it would be wise to use the lower estimate provided in the methodology.

Current information on the numbers of industrial fuelwood users is also not available and estimates of potential demand were taken from studies done by Hodge and Erhlich (1983) and Schaffer (1987). These reports indicate that total industrial and commercial heating requirements ranged from 1.6-2.02 petajoules or .0014 petajoules per business. Given that there are approximately 18 gigajoules/cord of wood, it is estimated that total potential demand would amount to a maximum of 277-263 m^3 (112-388 cords).

As with fuelwood for domestic heating, fuelwood is not expected to be able to completely replace alternative heating sources, particularly oil. As such it is necessary to estimate amount of conversion possible. Space heating with fuelwood in commercial districts is most likely to occur using hot water heating systems from centrally-fired boilers due to the close proximity of most commercial buildings and conversion to this system will take time.

Resistance to the use of wood for commercial uses

TABLE I - 1. Estimates of per capita lumber consumption (fbm) in Alaska, Yukon, Northwest Territories, and British Columbia

Year	Author	Region	Per capita consumption	Economy
1967	Gairns (1967)	Yukon	600	growth
1970	Schultz (1970)	NWT	762*	growth
1975	Schultz (1975)	NWT	432	low
1979	N. Springate & Assoc. (1979)	Yukon	842	high**
1981	Bohning (1986)	NWT	1118	high
1982	Reid Collins Alaska Inc.(1983)	Alaska	300	growth
1985	Peschke (1986)	Yukon	256	low
1982	FEPA (1986)	B.C.	586	average***
1987	Heartwell (1987)	Alaska	290	average****

Source: various

* Schultz reported a per capita consumption of M fbm/capita but this included lumber, plywood and miscellaneous roundwood. Bonnor reported per capita consumption of the latter two items at 238 fbm/capita and this amount was subtracted from the total.

** Springate (1979) undertook a market survey for Watson Lake Forest Products and was provided company estimates of production and sales. Using this data plus annual production figures for other operators Heartwell prepared an estimate of consumption. Consumption in 1977 was estimated to be 20.6 MM fbm (936.4 fbm/capita), 15.3 MM fbm in 1978 (695.45/capita), and 19.4 MM fbm in 1979.

*** This is the average for the period 1977-1982, with consumption ranging between 498 fbm/capita and 700 fbm/capita.

**** This is the average for the period 1977-1985 in Alaska, with consumption ranging between 193 fbm/capita and 373 fbm/capita.

has been high to date due to storage and handling problems, space for the stoves, pollution concerns, higher insurance premiums, inconvenience factors, and the untried technology. As such, in the next ten years it is estimated that about 15-20% of the industrial market will be converted, meaning that demand for fuelwood will be about 11 000 cords per annum or 24-713 m^3.

Data for the fuelwood markets in Alaska where provided by Pierce (1986), while the demand for fuelwood in Northwest Territories was not determined as it was felt that there was no market potential in the Northwest Territories for fuelwood exports from Yukon.

2.0 Lumber demand

Precise data on the total consumption of basic lumber products in Canada is not readily available and for Yukon is non existent. Statistics Canada develops consumption data by taking domestic production, plus imports of wood products into Canada minus exports. They then break down Canadian lumber consumption for the provinces into two categories; new housing and all other which includes repair and remodel, industrial, and material handling. Separate data on Yukon is not included in these publications.

In Yukon and in the adjacent regions Alaska, Northwest Territories, and British Columbia some point estimates of consumption and per capita consumption have been made over the years. Table A-1 outlines these data and the point in the business cycle these estimates occurred.

The Yukon estimates range from 256 fbm/capita to 842 fbm/capita. The Springate estimates appear to be somewhat high based on other regions while the Peschke estimates appear to be clearly too low. Peschke himself indicated in the report that total consumption was higher than stated from his survey as he did not include lumber products purchased by consumers directly from local truckers as backhaul, and products purchased directly by consumers in southern Canada.

A short visual survey of the new residential subdivisions in Whitehorse undertaken in May 1987 appears to confirm the underestimation by the fact that at least half of

the homes under construction were using home kits or lumber imported by truck or container directly from the south.

To get a general idea of the consumption levels, the 6.8 MM fbm in Peschke's estimate was combined with data on net domestic production. To estimate the production purchased directly from local producers we use the data provided by forestry officials on domestic production in 1985/86 (4745 M fbm) and subtract from this production the estimated sales of local production to retailers as reported by Peschke in his report (667.7 M fbm). Now overall consumption in 1985 would increase by 4077.3 MM fbm, bringing total consumption to about 10 880 M fbm in 1985.

These totals still underestimate total consumption as products bought directly from southern Canada by individuals, contractors, and government consumers would add an unspecified amount to this total. Hence, the lumber products consumption of 10 880 M fbm or 399 fbm/capita represents the minimum level of consumption in the Yukon for 1985. As well, given that 1985 was just the beginning of the market recovery, it would seem that 10 MM fbm would be the minimum market demand level for Yukon's present population size.

The figure of 300 fbm per capita as reported by Reid Collins Alaska Inc. (1982), and 293 fbm/capita obtained from Heartwell (1987) may be a fair reflection of consumption in Alaska but is considered too low for Yukon because the adjusted Peschke data suggests a minimum per capita consumption of 399 fbm. The Bohning data, which would give a total estimate of consumption of 1118 fbm is considered much too high as it would mean total consumption levels of almost 30 000 M fbm which is more than double any previous estimate considered and twice the per capita consumption of British Columbia.

The British Columbia data appears to indicate a balance between the two ranges that might reasonably represent Yukon. Therefore, it is assumed that the consumption in Yukon would follow the British Columbia pattern with an average of 586 fbm/capita, and a fluctuation between a low of 499 fbm/capita and a high of 708 fbm/capita. Total consumption in 1986 would be estimated to be 15.6 MM fbm. The range of fluctuation in demand assuming a static population will be between 13.3 MM fbm and 18.9 MM fbm. Given a rapid development in the last year the figure of 18.9 MM fbm would likely be a reasonable reflection of consumption.

Consumption data in the Northwest Territories was supplied by Bohning (1986), while data on Alaska forest consumption was created from data supplied by Knapp and Foster (1986) and an estimate for Alaska production for domestic sales of 15 MM fbm annually that was gained from personal communications with several Alaskan officials and academics. The estimates seem to be fairly close to those provided by Reed (1982) and were considered reasonable reflections of actual consumption.

APPENDIX II. Table Details

This appendix provides more detailed notes on several of the tables presented in the text of the document for those readers who wish to have greater explanation.

TABLE 9.

1. Data in the constant dollar column was deflated by the Statistics Canada consumer price index for fuel and utilities.

2. Fuelwood prices are based upon the commercial price for solid fuel in 2 ft lengths. Prices for 4 ft and 8 ft lengths are usually $10-15 less per cord.

TABLE 11.

1. Deloitte, Haskins and Sells (1986) was used to provide the production data. This report provides a rough estimate of production costs for a mill of $20 MM/ annum production. The actual costs at the Hyland Forest Products were likely in the $160-170/M fbm range until the end of November 1987 when new milling equipment began operation.

2. Various trucking companies were contacted to provide the estimate for hauling materials and are based on using 52 000 lb. vehicles and assuming that each M fbm weighs 2200 lbs.

3. Data from B.C. was provided by Price Waterhouse and is based upon an annual survey of 68 larger mills in the interior of B.C. These numbers represent the average production costs. Most mills produce lumber at costs that range from $77-90/M fbm.

TABLE 17.

1. Delivery Costs are based on hauling from Watson Lake to Vancouver using backhaul rates, and by ship to Japan. The costs are estimated to be $65 Cdn/M fbm from Watson Lake to Vancouver and $67 Cdn from Vancouver to Japan. The information was obtained from discussions with several trucking firms. British Columbia costs are based on rates provided from CN and Gearbulk for delivery costs from Prince George to Japan, assuming a standard export package.

2. Handling costs involve all costs associated with storing and loading the cargo on the ship and were obtained from conversations with firms operating from the ports.

TABLE 18.

Yukon costs are derived as follows: Capital costs are assumed to be 10% higher than that outlined in the British Columbia study. Wood costs are assumed to be equal to the contract rate of $100 paid by Hyland Forest Products. Energy costs are based on using 2345 kwh/Admt and assuming 4.0 cents per kwh. Labor costs are assumed to be 20% higher as determined by the average weekly wage difference between Yukon and Canada. It was assumed that chemicals would cost 20% more due to the extra transportation charges. The BKP data was converted from US to Cdn dollars at a rate of 1.2953 Cdn=$1 US. The table includes variable costs only with no provision for financing costs, depreciation, taxes, and overhead.

TABLE 20.

1. Wood costs are assumed equal to the delivered cost of fuelwood in the Whitehorse area as outlined in Loeks (1985).

2. Mill costs were derived from Pierce (1986) and are based on work done in Alaska by Allan Richmond. Costs were $22.40 US/ton converted to bdu and Cdn dollars.

3. Transportation costs from Vancouver to Skagway are based on a figure of $3.43 Cdn/100 wt quoted by Seattle firms. The charges for moving chips from Whitehorse to Skagway were estimated to be $27.50/bdu.

4. Handling charges are based upon a figure of $15/M fbm quoted by Whitehorse transportation companies for handling lumber with the M fbm converted to bdu.